Parts Manual
823225
06/03/2013

Quackenbush®

180SC-225 Drill
Self Colleting

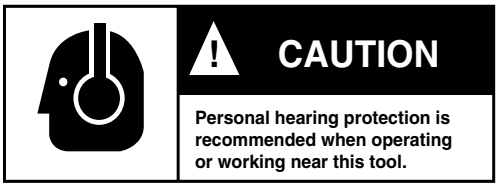
For additional product information visit our website at www.apextoolgroup.com

Safety Recommendations

For your safety and the safety of others, read and understand the safety recommendations and operating instructions before operating any drill motor.

Always wear protective equipment:

For additional information on eye protection, read the latest edition of ANSI Z87.1, Occupational and Educational Eye and Face Protection. This standard is available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, N.Y. 10036.



Hearing protection is recommended in high noise areas (above 85dBA). Close proximity of additional tools, reflective surfaces, process noises, etc., can contribute substantially to the sound level experienced by the operator.

Follow good machine shop practices. Rotating shafts and moving components entangle and entrap, and may result in serious injuries. Never wear long hair, loose-fitting clothes, gloves, ties, or jewelry when working with or near a drill of any type.

Quackenbush drills are designed to operate on 90psig (6.2 bar) maximum air pressure using the proper hose. Excessive air pressure increases the loads and stresses on tool parts and drills, and may result in breakage. The installation of a filter-regulator-lubricator in the air supply line ahead of the tool is highly recommended.

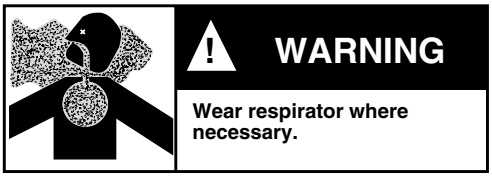
CAUTION

- Before the tool is connected to the air supply, the throttle should be checked for proper operation (i.e., throttle valve moves freely and returns to closed position).

- Before removing a tool from service or changing drill bits, make sure the air line is shut off and drained of air. This will prevent the tool from operating if the throttle is accidently engaged.

- Cutting tools used with these drill motors are sharp. Handle them carefully to avoid injury.

- The collet and mandrel must be inserted into a properly sized pre-drilled hole before starting the tool. An improperly sized pre-drilled hole prevents the mandrel from engaging the collet and could result in slippage of the tool. An improperly selected collet and mandrel can also result in slippage of the tool.



Drilling or other use of this tool may produce hazardous fumes and/or dust. To avoid adverse health effects utilize adequate ventilation and/or a respirator. Read the material safety data sheet of any cutting fluids or materials involved in the drilling process.

CAUTION

Some non-ferrous metal chips (or dusts) are combustible. Examples: Aluminum, magnesium, Titanium, and Zirconium. See the material safety data sheets for combustibility of materials drilled. Never collect spark generating material with combustible material. Examples: Collecting both steel and aluminum or steel and titanium.

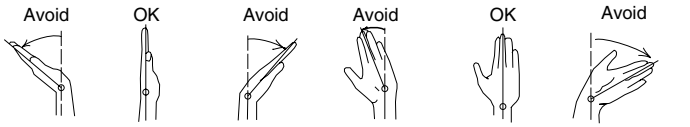
Quackenbush drills are often used with lubricant or cooling systems which must be properly maintained to avoid leakage. Failure to do so can result in serious injuries from slipping on oily surfaces.

Safety Recommendations

Due to the number and variety of tooling applications, the user's methods engineering departments, ect., must consider any hazards that may be associated with each specific application of this product and provide adequate operator protection from inadvertent contact with any moving components. The clamping and feed mechanisms of self-colleting drill motors are exposed for visibility and can move when the air supply is connected or disconnected. To avoid injury, keep fingers and hands away from these areas when handling or operating this tool.

Some individuals are susceptible to disorders of the hands and arms when exposed to vibration and/or tasks which involve repetitive work motions. Those individuals predisposed to vasculatory or circulatory problems may be particularly susceptible. Cumulative trauma disorders such as carpal tunnel syndrome and tendinitis can be caused or aggravated by repetitious, forceful exertions of the hands and arms. These disorders develop gradually over periods of weeks, months, and years. Tasks should be performed in such a manner that the wrists are maintained in a neutral position, which is not flexed, hyperextended, or turned side to side. Stressful postures should be avoided and can be controlled through tool selection and work location.

Any tool operator should be aware of the following warning signs and symptoms so that a problem can be addressed before it becomes a debilitating injury. Any user suffering from prolonged symptoms of tingling, numbness, blanching of fingers, clumsiness or weakened grip, inability to hold objects, nocturnal pain in the hand, or any other disorder of the shoulders, arms, wrists, or fingers should notify their employer so that a review of what steps might be taken to prevent further occurances. These steps might include but are not limited to, repositioning the workpiece or redesigning the workstation, reassigning tool users to other jobs, rotating jobs, changing worker pace, and/or changing the type of tool used so as to minimize stress on the operator. Some tasks may require more than one type of tool to obtain the optimum operator/ tool/ task relationship.



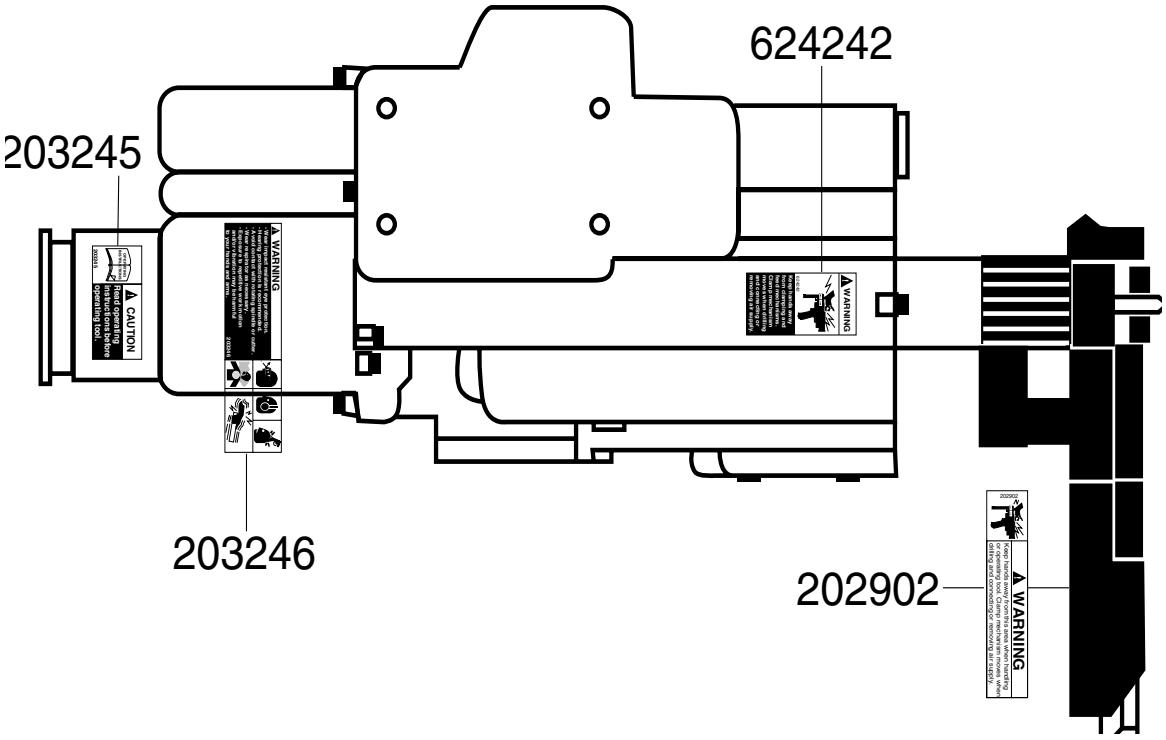
The following recommendations will help reduce or moderate the effects of repetitive work motions. The operator of any drill should:

- Use a minimum hand grip force consistent with proper control and safe operation
- Keep body and hands warm and dry
- Avoid anything that inhibits blood circulation
  - — Smoking Tobacco
  - — Cold Temperatures
  - — Certain Drugs
- Avoid awkward postures
- Keep wrists as straight as possible
- Interrupt work, activities, or rotate jobs to provide periods free from repetitive work motions.

Safety Recommendations

Safety Labels

The safety labels found on this tool are an essential part of this product. Labels should not be removed. Labels should be checked periodically for legibility. Replace safety labels when missing or when the information can no longer be read. Replacement labels can be ordered by the part numbers shown on this page.



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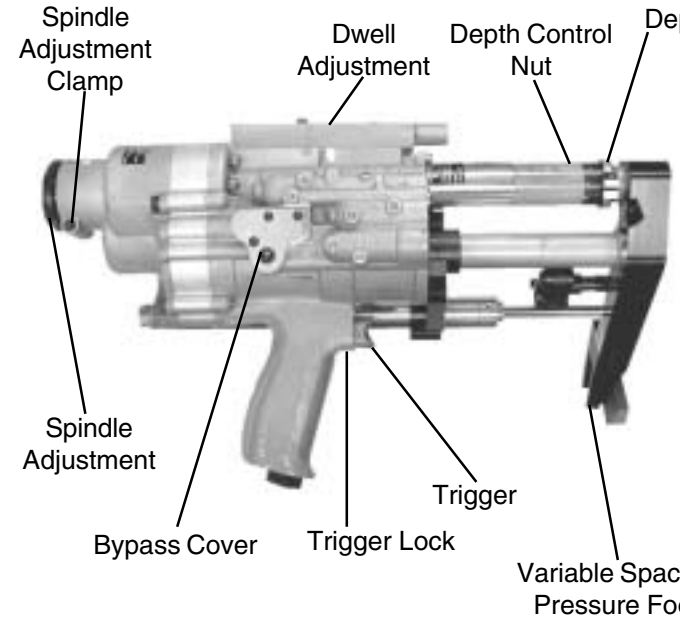
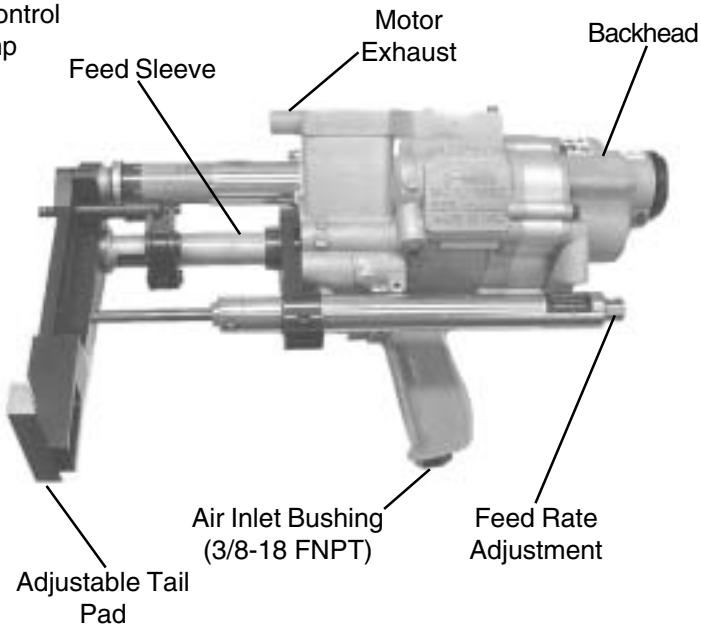
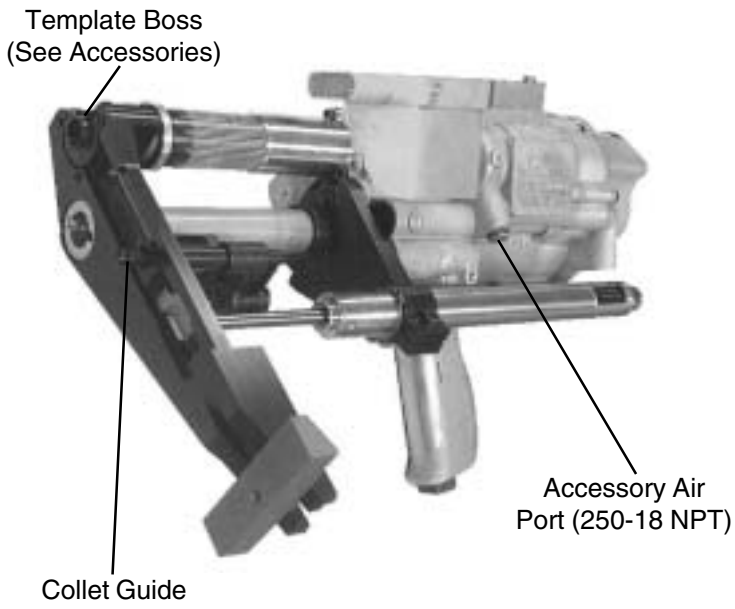
Major Tool Components







Special Tools

Introduction and General Information

The 180SC-225 is air operated, hydraulically controlled tool that automatically clamps to the material, drills and countersinks close tolerance holes in one operation. The 180S will produce high quality holes in aluminum, steel, titanium and petroleum hybrid materials primarily found in the aircraft/ aerospace industries. The 180S self-colleting drill motor has been designed using state-of-the-art technology that provides maximum power,minimum weight and the highest degree of accuracy for demanding hole preparation requirements.

Technical Data

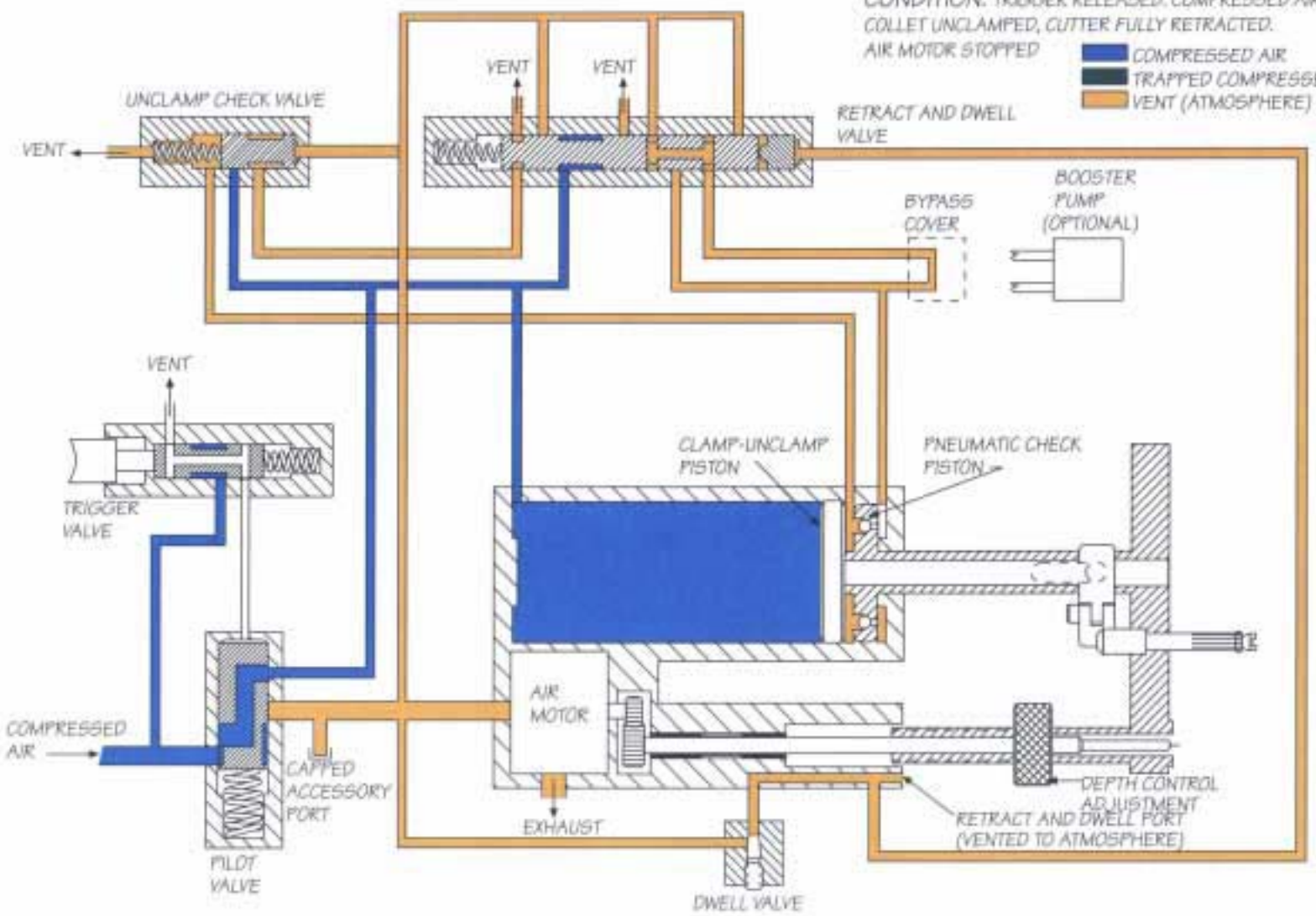
Feed Stroke: Feed stroke of the 180SC-225 is 2.25 inches to drill and countersink in 2 inch stacked material. The feed stroke is unaffected by the collet stroke.
Collet Stroke: The 180SC-225 will clamp throughout its .875 inch stroke. Feed stroke is unaffected by collet stroke.
Spindle Adjustment: The spindle adjustment of .375 inch allows for drill length variations. See Spindle Adjustment information on page 25.
Countersink Depth Control: A micrometer adjustment provides for countersink stop repeatability within .001 inch.
Cutter Sizes: The 180SC-225 will accommodate .500 diameter drills and.875 countersink diameter.
Feed Rate: An adjustable drill feed rate mechanism enables the 180SC-225 to drill from 5 seconds per inch to 1 minute per inch. See Feed Rate Adjustment information on page 25.
Cutter to Collet Spacing: The cutter to collet distance is adjustable between 1.00 inch minimum to 3.50 inch maximum.
Coolant: The 180SC-225 has a drill point coolant port in the pressure foot. A coolant mist lubricator is available (See Accessories Page 32-38)
Air Motor: The air motor for the 180SC-225 is rated at 1.8 horsepower nominal when supplied with air at 90 p.s.i.
Air Consumption: Air consumption of the 180SC-225 is 68 c.f.m. at 90 p.s.i. dynamic.
Weight: 180SC-225 weight with the aluminum pressure foot is 14.9 pounds.
Spindle Speeds: Eleven geared spindle speeds are available with the 180S: 240, 420, 650, 850,1050, 2000, 3100, 4900, 6300, 12500 and 21000 RPM. See pages 31 and 32 for gear set assembly configurations.
Trigger Lock: A trigger lock is provided which allows the tool to be locked in the "Operate" position. With the lock activated, the tool will run through the clamp, feed and retract cycles, but it will not unclamp or stop the motor until the trigger lock is manually released.

Tool Start-Up

The 180SC-225 drill is shipped from the factory equipped to the customer's specifications: spindle RPM, spindle to accommodate cutter type desired, pressure foot type, collet guide to accommodate collet desired and optional booster pump (if required).
After unpacking, examine the customer-specified equipment on the 180SC-225 tool to verify type and speed of components. Attach air line to 3/8-18 NPT inlet bushing. If quick disconnect fittings are used, 3/8 in. ID are minimum. The 180SC-225 drill requires a supply of clean 90-100 PSI air. Air consumption is 45 CFM at 90 PSI. The use of the in-line lubricator will provide the proper lubrication for the air motor and will significantly increase the tool life expectancy. Because O-rings are extensively used to seal systems within the tool, the elimination of foreign particles and other contaminants will reduce the possibility of damage to these parts. Always inspect O-rings for damage or wear and replace as required. The use of silicone O-ring lubricant is strongly recommended during reassembly. The addition of oil in the air line will also increase motor and valve life as well as the life of the O-rings. Avoid the use of synthetic lubricants to prevent damage to O-rings and seals.

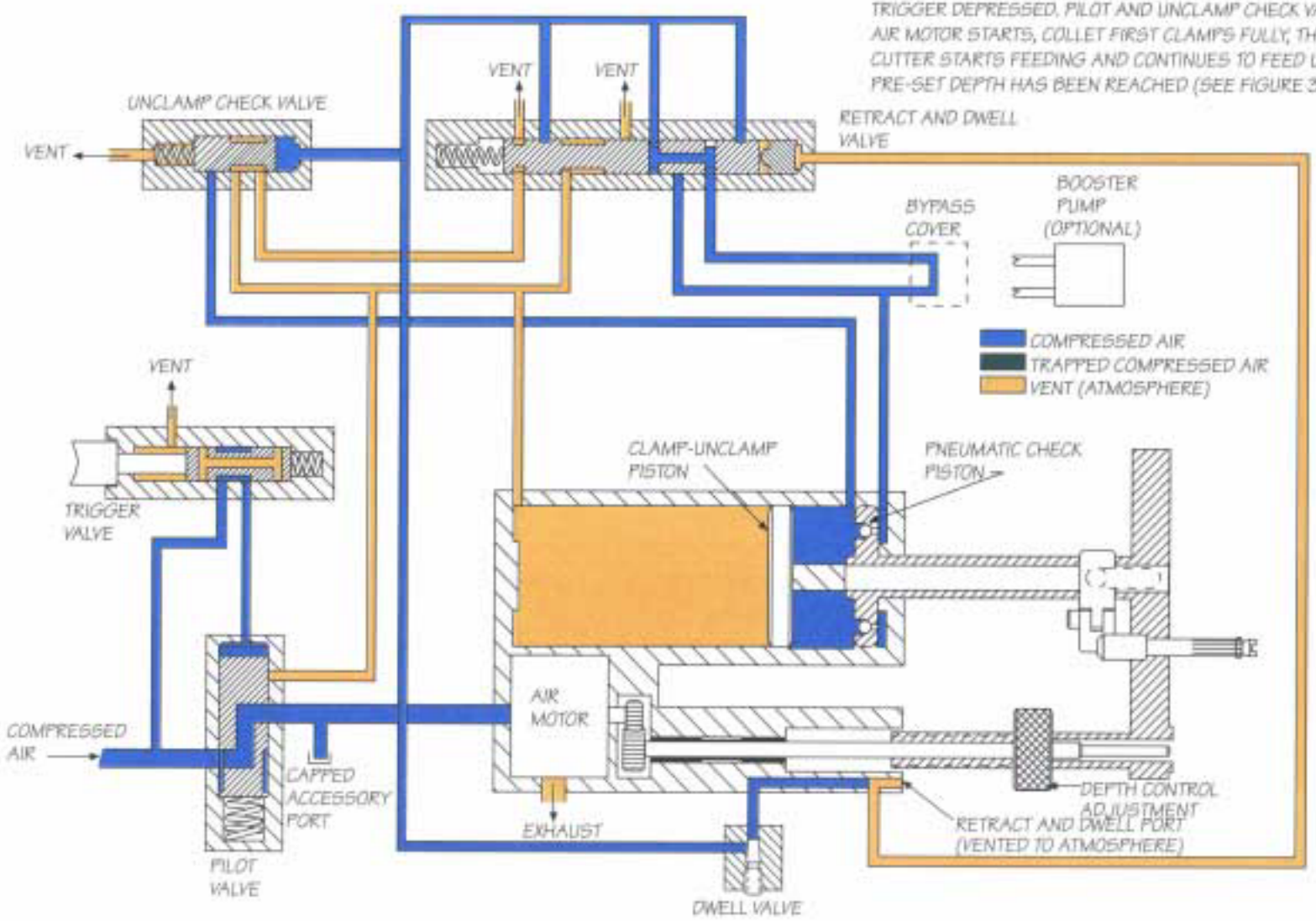
180SC-225 DRILL SPECIFICIATIONS

WEIGHT	180SC-225-14.0 LBS. MAX. W/ALUMINUM FOOT
AIR CONSUMPTION	68 C.F.M. @ 90 P.S.I. DYNAMIC
HORSE POWER	APPROX. 180S-1.4 @ 90 P.S.I.
O/A LENGTH	180S-15.28 IN. MAX AT FULL EXTENSION
STROKE	2.225 IN. (DRILL & C/SINK 2 IN. STACK)
COLLET STROKE	.875 IN. (NO LOSS OF FEED STROKE)
COUNTERSINK	COUNTERSINK STOP REPEATS WITHIN .001 IN.
FEED RATE	MIN. 5 SEC. PER INCH, MAX 1 MIN. PER INCH
SPINDLE SPEEDS	240, 420, 650, 850, 1050, 2000, 3100, 4900, 6300, 12500, 21000
DRILLING THRUST	300 LBS. MAX. (WITHOUT BOOSTER PUMP)
CLAMP FORCE	548 LBS. START CLAMP STROKE (UNREGULATED AIR) 460 LBS. FULL CLAMP STROKE (UNREGULATED AIR)
SPINDLE ADJUSTMENT	.375 IN. ADJUSTMENT TO ALLOW FOR DRILL LENGTH VARIATIONS
MAX. DRILL SIZES	.500 DRILL/.875C/SINK
COLLET FOOT SPACING	1.00 IN. MIN. - 3.50 IN. MAX.
SPINDLE	.500 IN. DIA. W1/4-28 & 3/8-16 O.D. THD OR 1/4-28 I.D. THD THREAD TYPE DRILLS OR 1/4-28 TAPER-LOK TYPE DRILLS.
COOLANT	AIR BLAST PORT & DRILL POINT PORT IN TEMPLATE STD., COOLANT MIST LUBRICATOR AVAILABLE.


1. DIAGRAM OF AIR SYSTEMS IN STANDBY CONDITION. TRIGGER RELEASED. COMPRESSED AIR ATTACHED, COLLET UNCLAMPED, CUTTER FULLY RETRACTED. AIR MOTOR STOPPED
COMPRESSED AIR
TRAPPED COMPRESSED AIR
VENT (ATMOSPHERE)
VENT
VENT
UNCLAMP CHECK VALVE
VENT
RETRACT AND DWELL VALVE
BYPASS COVER
BOOSTER PUMP (OPTIONAL)
VENT
TRIGGER VALVE
CLAMP-UNCLAMP PISTON
PNEUMATIC CHECK PISTON
AIR MOTOR
COMPRESSED AIR
CAPPED ACCESSORY PORT
EXHAUST
DEPTH CONTROL ADJUSTMENT
RETRACT AND DWELL PORT (VENTED TO ATMOSPHERE)
PILOT VALVE
DWELL VALVE

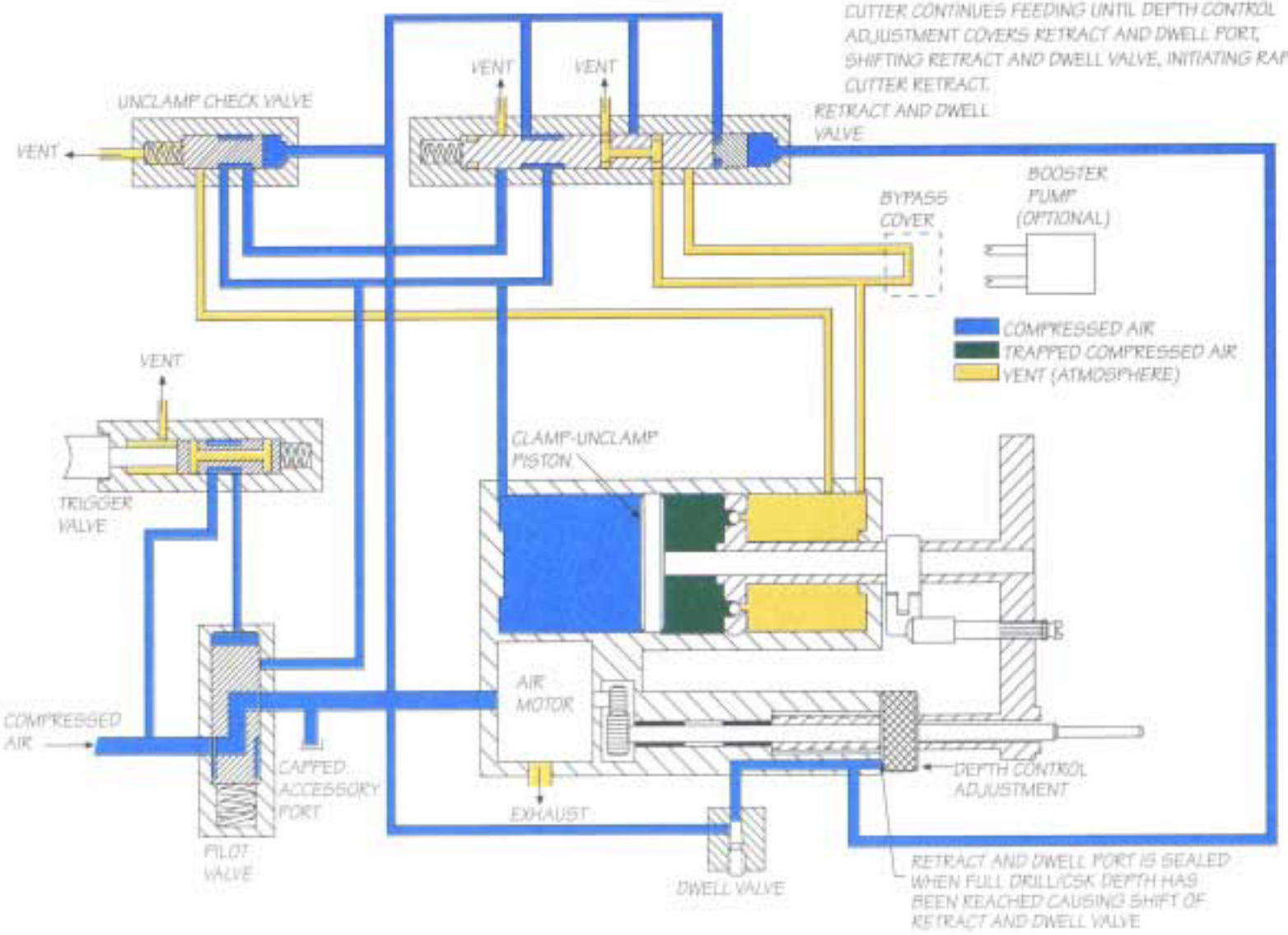
2. DIAGRAM OF AIR SYSTEMS AT FULL COLLET STROKE AND START OF CUTTER FEED

TRIGGER DEPRESSED. PILOT AND UNCLAMP CHECK VALVES SHIFT, AIR MOTOR STARTS, COLLET FIRST CLAMPS FULLY, THEN THE CUTTER STARTS FEEDING AND CONTINUES TO FEED UNTIL PRE-SET DEPTH HAS BEEN REACHED (SEE FIGURE 3).

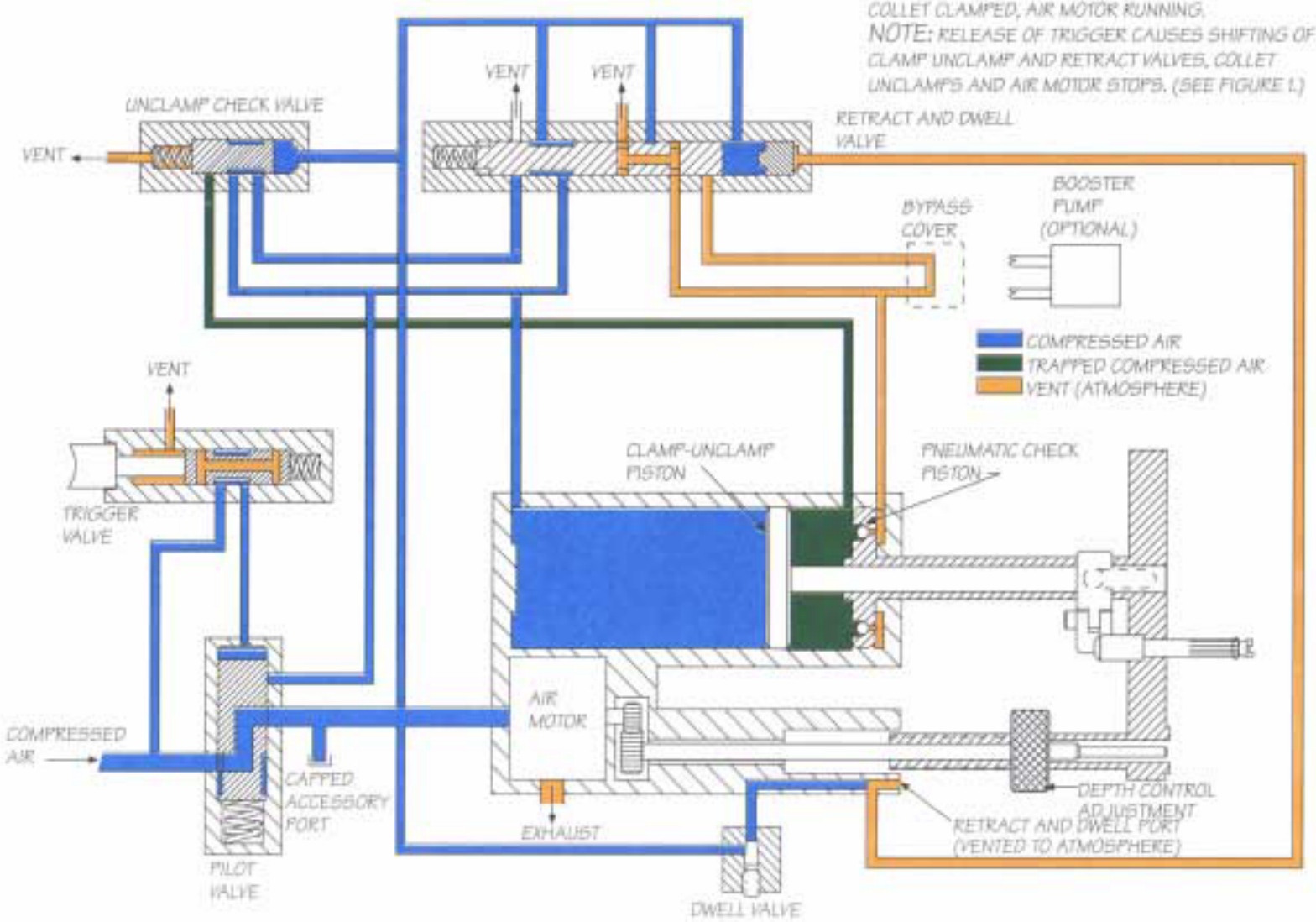


3. DIAGRAM OF AIR SYSTEMS AT PRE-SET CUTTER DEPTH AND START OF RETRACT.

TRIGGER DEPRESSED, AIR MOTOR RUNNING COLLET CLAMPED, CUTTER CONTINUES FEEDING UNTIL DEPTH CONTROL ADJUSTMENT COVERS RETRACT AND DWELL PORT, SHIFTING RETRACT AND DWELL VALVE, INITIATING RAPID CUTTER RETRACT.

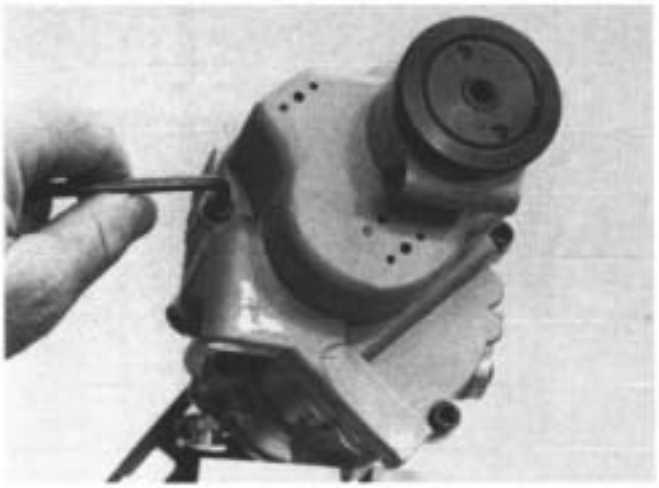


4. DIAGRAM OF AIR SYSTEMS AT COMPLETION OF RETRACT STROKE. TRIGGER DEPRESSED, COLLET CLAMPED, AIR MOTOR RUNNING.
NOTE: RELEASE OF TRIGGER CAUSES SHIFTING OF PILOT, CLAMP UNCLAMP AND RETRACT VALVES, COLLET UNCLAMPS AND AIR MOTOR STOPS. (SEE FIGURE 1.)

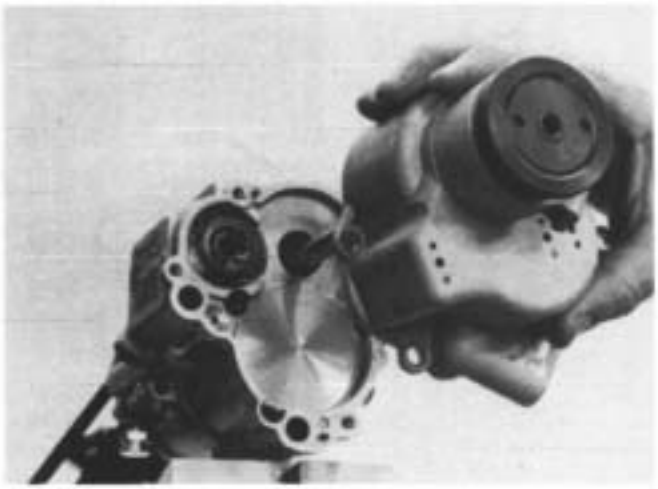


I. Backhead Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.



1. Remove four ¼"-20 cap screws.

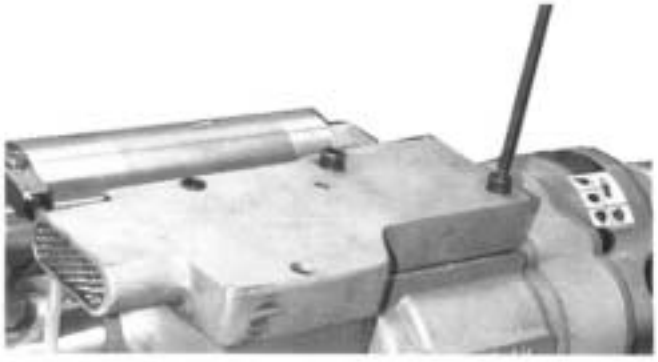


2. Pull backhead with spindle attached straight out of tool.

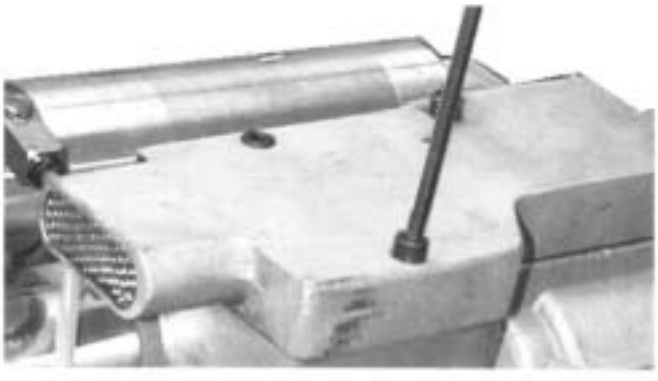
NOTE: Three O-rings in recessed cavities should remain in place in backhead mating surface.

II. Air Motor Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.



1. Remove rear two 5/32" hex head cap screws and remove muffler subassembly.



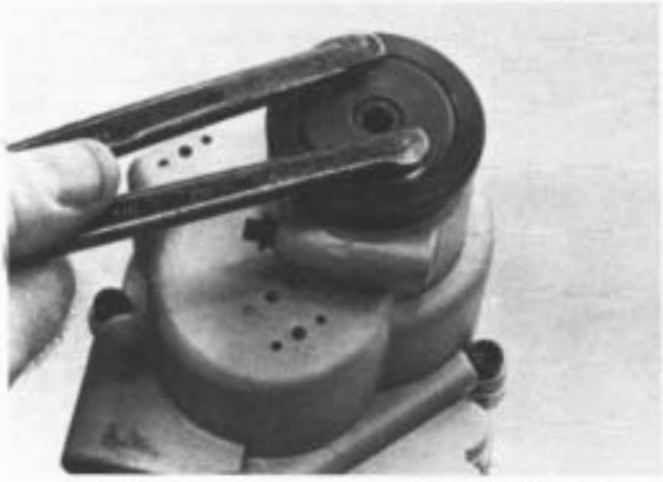
2. Remove all four 5/32" hex head cap screws to disassemble and inspect muffler subassembly.

3. Tap housing gently on surface to remove air motor. The complete motor includes rotor with blades, cylinder, and front and rear bearing plates. The exhaust slots on the motor should be indexed 180° away from the exhaust on housing.

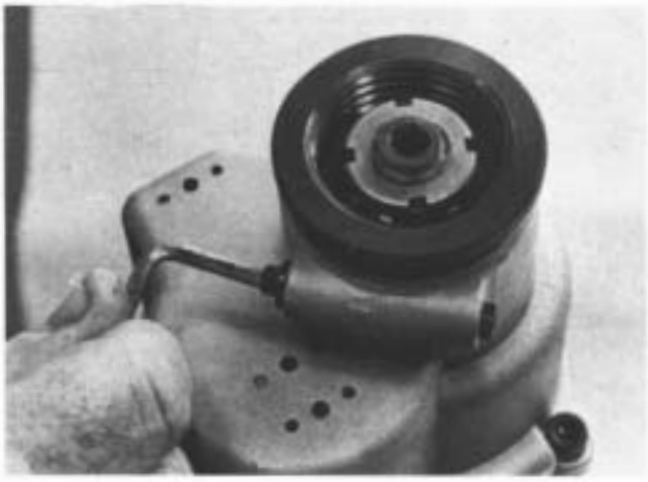
III. Spindle Adjustment Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

NOTE: Spindle adjustment disassembly is necessary only to service bearings and to change spindles. Otherwise, the backhead assembly can be removed intact to service other internal assemblies, such as the air motor.

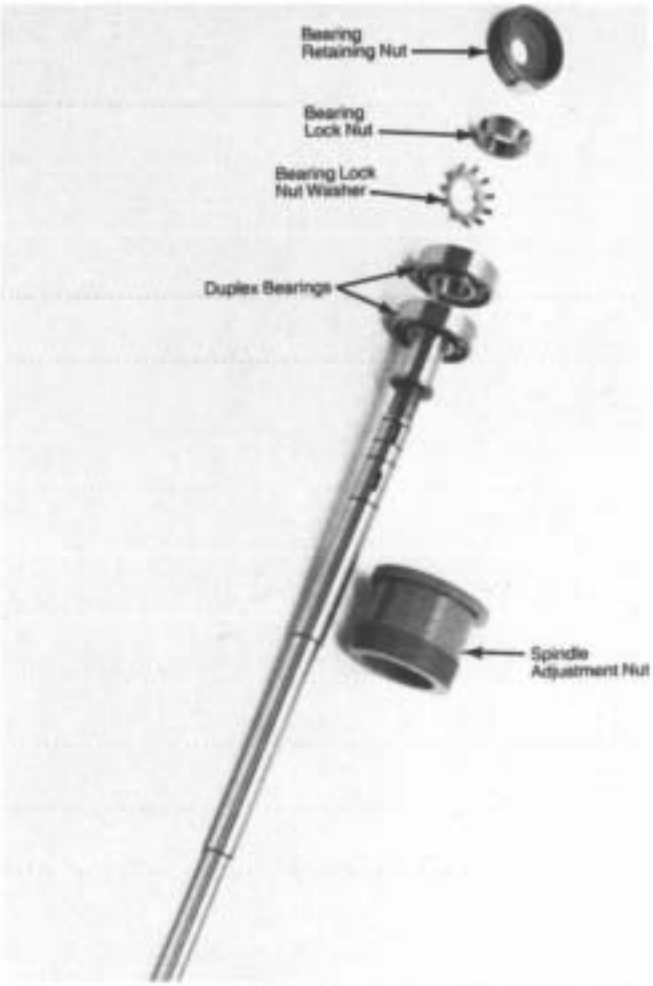


1. Use suitable spanner wrench to unscrew bearing retaining nut.

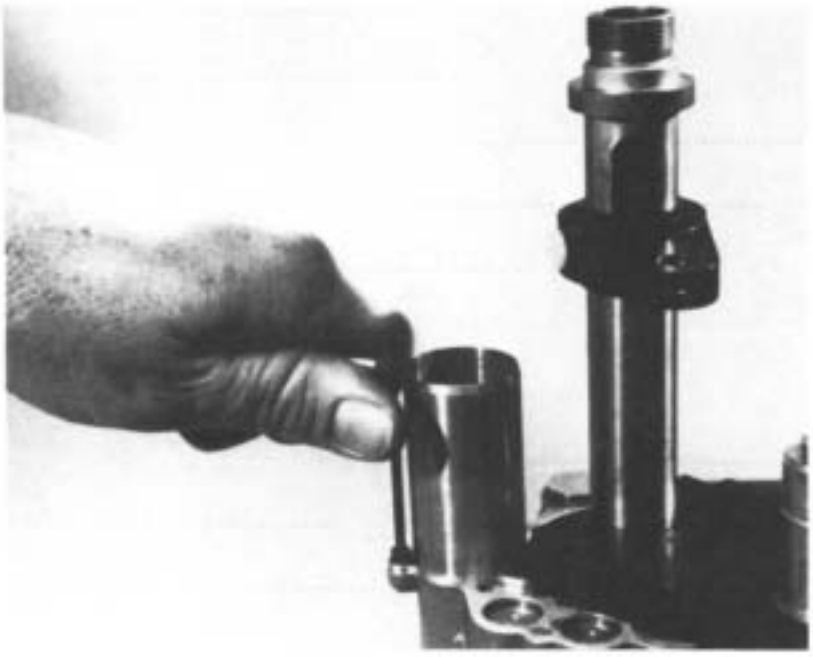


2. Use Allen wrench to loosen and remove tapered locking screw in rear housing.

3. Unscrew spindle adjustment nut and remove nut with spindle.



4. Tap spindle adjustment nut to remove spindle and duplex ball bearings.
5. Unscrew bearing lock nut and bearing lock nut washer with special Bearing Lock Nut Assembly Tool (Part No. 623075).
6. To remove spindle gear, remove retaining ring and slide gear off spindle.



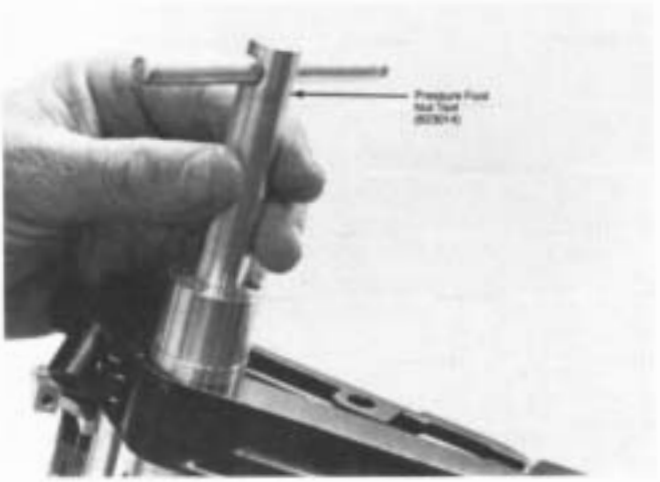
NOTE: It may be necessary to remove four socket cap screws which retain gear set before removing spindle gear.

NOTE: To reassemble, 1st duplex ball bearing must seat firmly on spindle shoulder. Add 2nd ball bearing back-to-back with part number on bearings facing away from each other. Then add bearing lock washer and bearing lock nut. Tighten with special tool until inner race seats solid. Screw in bearing adjustment nut and bearing retaining nut and tighten until nut seats solid.

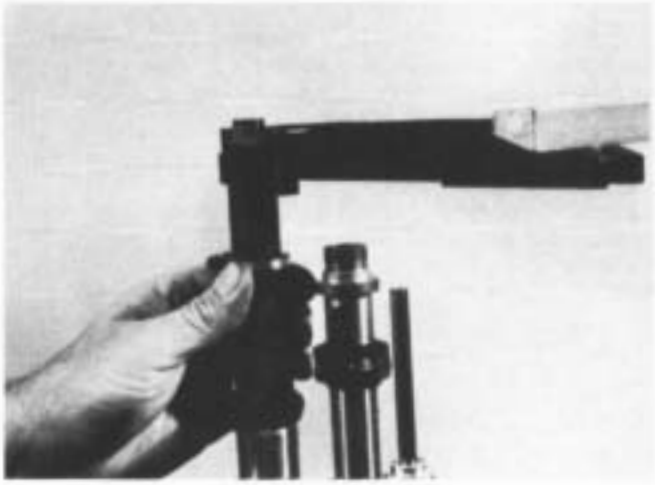
NOTE: Bearing lock nut and bearing retaining nut must be seated solidly to prevent end play in spindle and cutter.

IV. Quill & Pressure Foot Removal

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.



1. Remove Pressure foot nut with appropriate spanner wrench or with Special Pressure foot nut tool (Part No. 623014).



2. Pull pressure foot forward to remove quill and pressure foot from tool housing and feed sleeve.

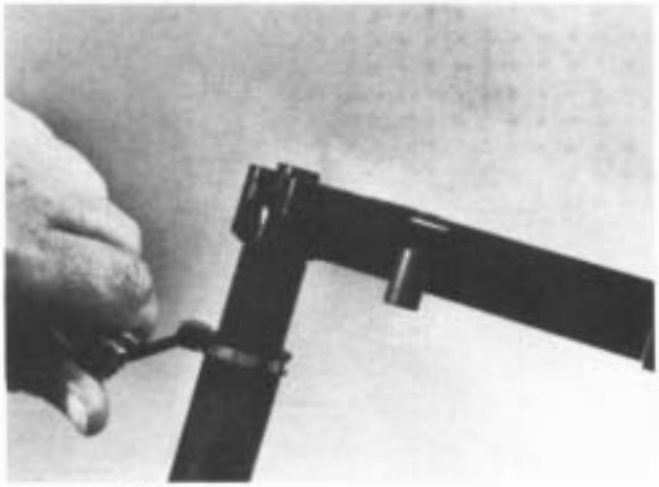
NOTE: It is not necessary to remove the backhead and gear assembly to replace or service the quill and pressure foot.

V. How to Change Quills

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

1. Follow Quill and Pressure Foot disassembly instructions in No. 4 above.

NOTE: If tool is equipped with template boss, remove three socket cap screws and remove template boss.



2. Loosen depth control clamp.

3. Unscrew depth adjust nut and slide off end of quill.

4. Unscrew quill from pressure foot.

5. To replace spindle, follow Step 3 above to reomove spindle adjustment assembly. Unstall appropriate spindle for cutter to be used and reassemble.

VI. Feed Clamp Disassembly

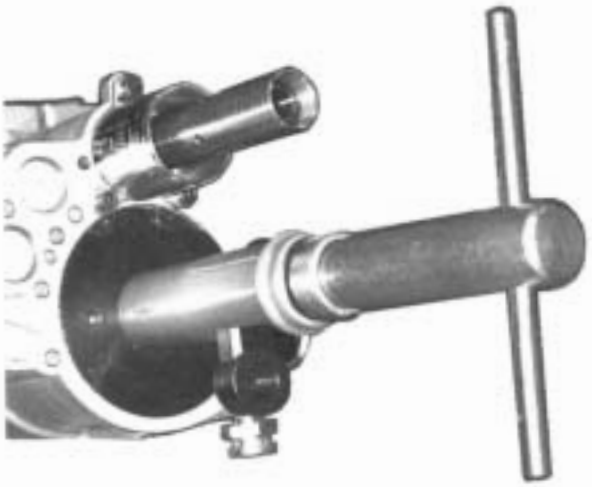
WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

NOTE: Follow instructions in Step 4 above to remove quill and pressure foot.

1. Remove feed control cylinder by removing three flathead screws with 5/32" hex wrench.

2. Remove retainer ring 812231 and linkage clevis pin 625649.

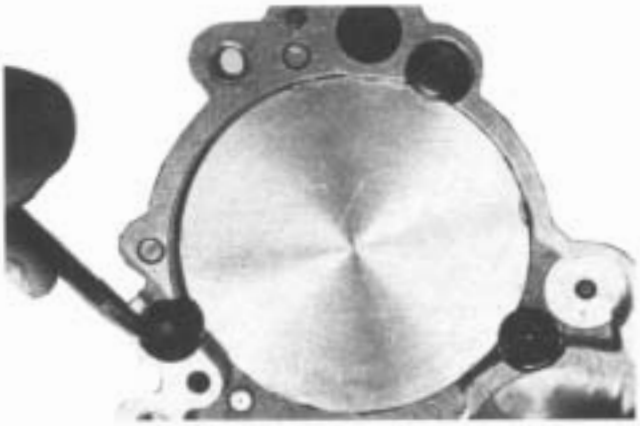
WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

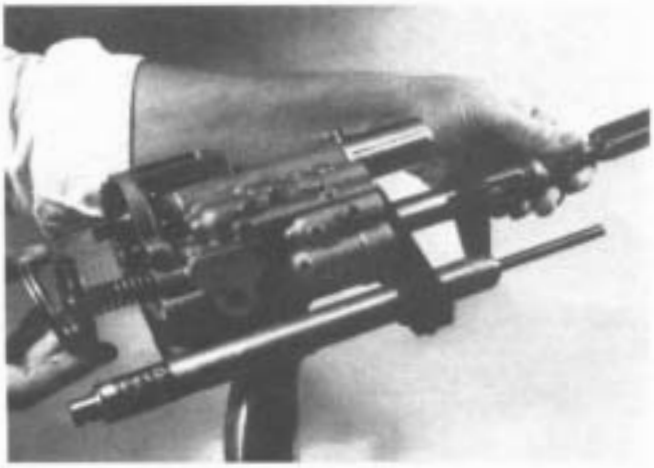


3. With air connected, unscrew pull rod bushing 625647.

DISCONNECT AIR FROM TOOL.

With rod push in on the pull rod to remove pressure on lift finger and the lift finger will come out.

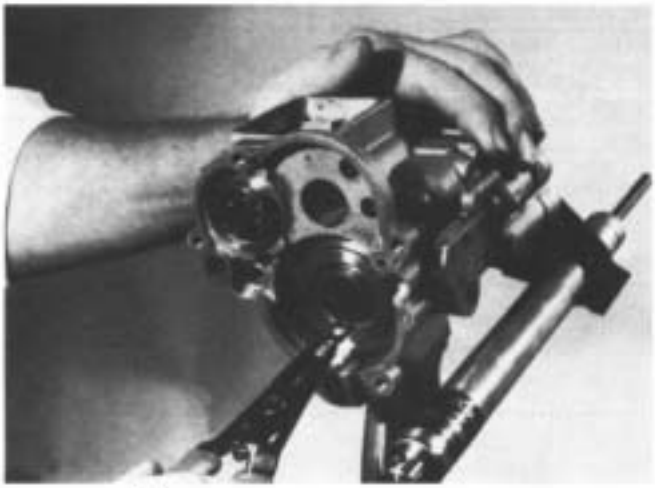




4. Turn tool around in vise and remove three button head screws which hold the rear bulkhead in place.

5. Insert rod through end of feed sleeve and push to remove rear bulkhead with clamp/unclamp piston and collet spring assembly.

NOTE: Examine O-ring on rear bulkhead and replace if damaged.



6. Expand and remove retaining ring on feed sleeve.

7. Remove clamp check piston with spreader pliers.

8. Expand and remove retaining ring from feed sleeve.

9. Remove feed sleeve from front of tool.

10. Compress front bulkhead retaining ring, then pull on 2 screws inserted in front bleed port holes and remove front bulkhead.

NOTE: During reassembly, retaining ring grooves should be liberally packed with O-ring lubricant to prevent damage to inner O-rings while slipping past grooves on sleeve. While compressing retaining ring, tap front bulkhead flush with front of handle.

VII. Dwell Valve Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

1. Remove needle valve from housing with Allen wrench.

VIII. Disassembly of Feed Control Plug

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

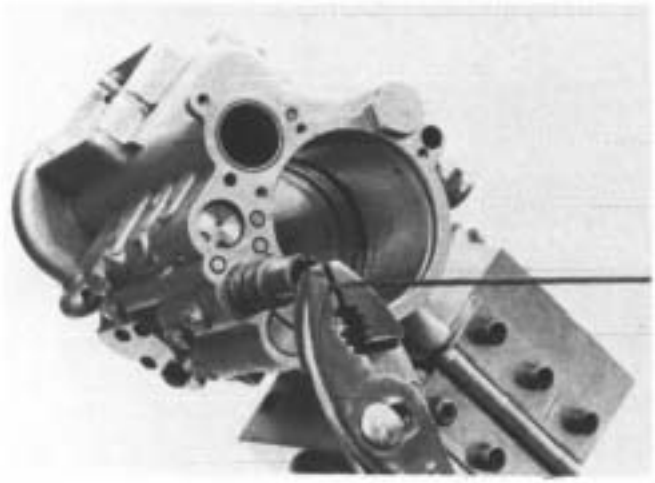
1. Remove feed control plug with suitable tool.

IX. Unclamp Check Valve Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

1. Compress and remove retaining ring or valve retaining plug. Remove plug using 4-40 screw if necessary.

2. Lift spool and spring out of cavity and place in clean area.



3. Carefully insert soft metal hook into hole in valve sleeve and lift out with pliers applied to wire. Be careful not to score or scratch the inside diameter of the sleeve. Carefully inspect O-rings for damage and replace if necessary.

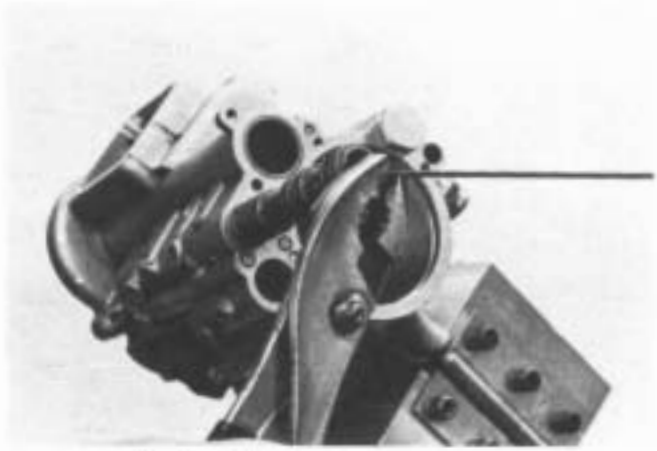
X. Retract and Dwell Valve Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

1. Compress and remove retaining ring on valve retaining plug. Remove valve retaining plug using 4-40 screw if necessary.

2. Lift out latching spool.

3. Remove retract and dwell valve spool and spring.



4. Carefully insert soft metal hook into hole in sleeve and lift out with pliers applied to the wire. Be careful not to score or scratch the inside diameter of the sleeve. Carefully inspect O-rings for damage and replace if necessary.

NOTE: Valve spool-to-sleeve is a hand-lapped fit. Exercise extreme caution against scratching and scoring when handling. Always place components in a clean, dry area.

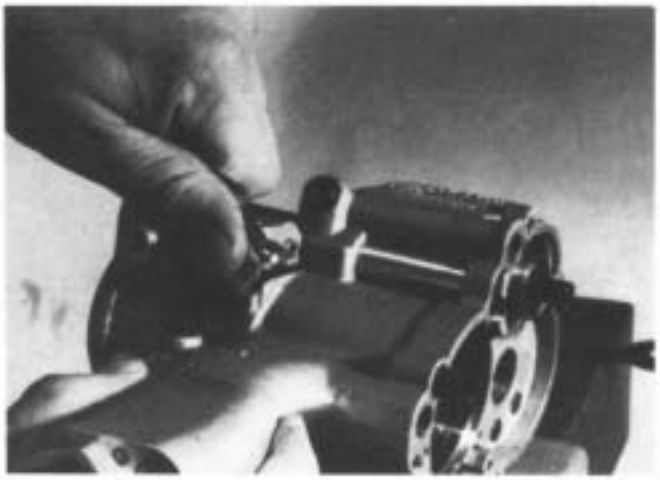
5. When reassembling, apply O-ring lubricant liberally to prevent damage to O-rings as they are pushed past ports on the inside cavity.

NOTE: Spring on end of spool should be retained in hole in end of spool with grease during reassembly.

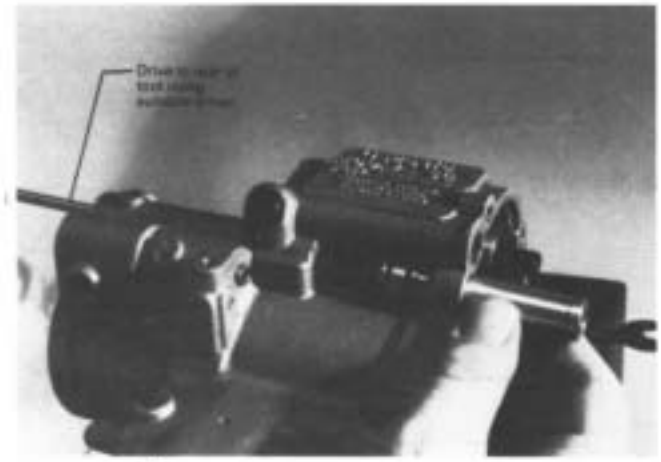
XI. Hydraulic Fluid Reservoir Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

1. Unscrew hex head reservoir plug.



2. Remove set screw



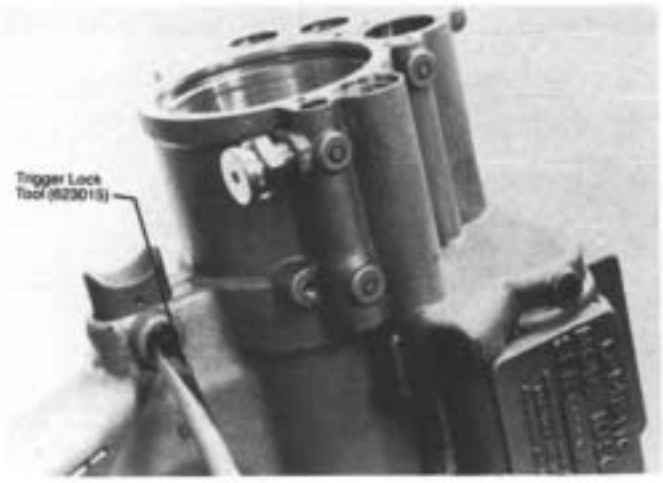
3. With suitable driver, drive out oil reservoir plug through the rear of the housing. Caution: Do not score or scratch inside of bore with driver.

4. When reassembling, the oil reservoir plug must be inserted from the rear of the tool. Failure to follow reassembly instructions will result in damaged O-rings.

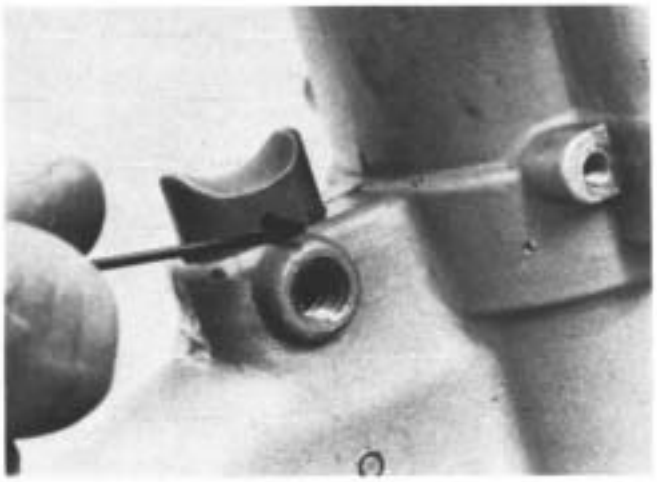
NOTE: Inspect O-rings for damage and replace if necessary.

XII. Trigger Disassembly

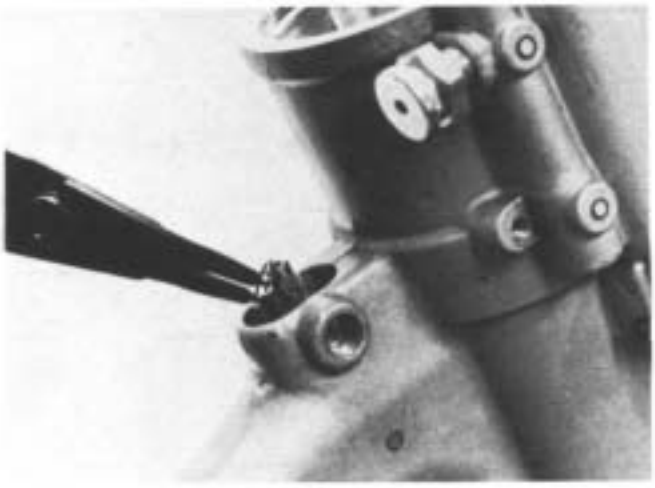
WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.



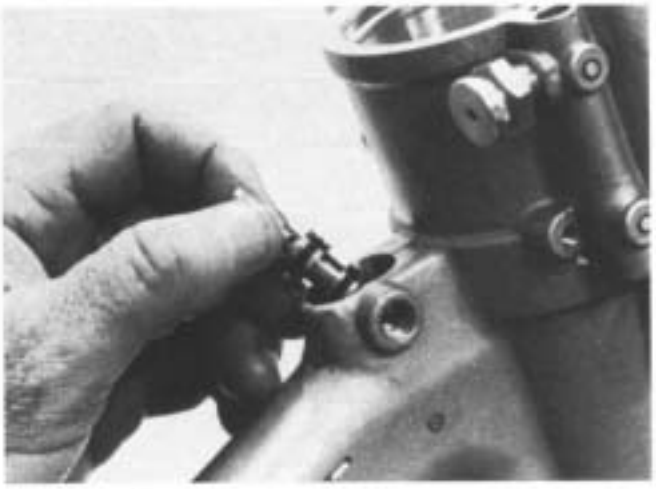
1. Use special Trigger Lock Assembly Tool (Part No. 623015) to remove trigger lock by unscrewing from handle.
NOTE: Use Loctite on threads when reassembling trigger lock.



2. Loosen and remove set screw in trigger and remove trigger.



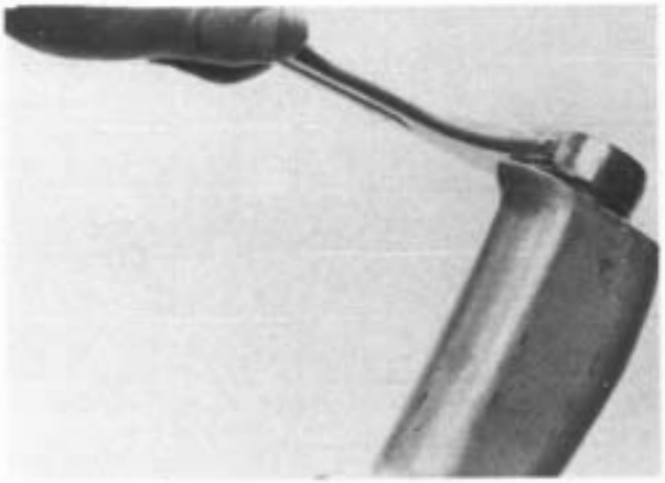
3. Remove the retaining ring from the trigger bore.



4. Lift out trigger spool and sleeve.
5. Remove spring from trigger cavity.

XIII. Pilot Valve Disassembly

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.



1. Remove inlet bushing.

2. Remove spacer.

3 Insert long 8-32 screw into tapped hole provided in base of pilot spool and lift out.
NOTE: Be careful not to bend pilot spool when removing or inserting. A bent spool will cause the tool to malfunction and will require spool replacement.

Tool Adjustments

WARNING: Disconnect air-supply before servicing.
Clamp mechanism moves when connecting or removing air supply.
Keep hands and fingers away from clamping and feed mechanism.

Spindle Stroke Adjustment

Loosen spindle adjustment lock, then turn spindle adjustment knob. Right hand rotation advances cutter foward; left hand rotation returns cutter. Correct cutter point position is flush with face of template boss. When cutter is properly adjusted, lightly tighten spindle adjustment lock to hold adjustment.

Micrometer Depth Adjustment

Loosen adjustment clamp, and rotate depth adjustment nut. Clockwise rotation decreases depth; counterclockwise increases depth. Graduations scribed on barrel are in .001" increments. When proper depth is achieved. lightly tighten adjustment clamp.

Feed Rate Adjustment

With appropriate tool, turning feed rate adjustment counterclockwise, increase feed rate. Turning the screw clockwise decreases feed rate. Feed rate can be measured by using the following formula:

$$\text{Time to drill one inch} = \frac{60 \text{ seconds}}{\text{Feed Rate} \times \text{Spindle Speed (rpm)}}$$

Dwell Adjustment

Insert appropriate size allen wrench into dwell adjustment valve opening. Rotate wrench clockwise until valve seats lightly. Rotate valve counterclockwise 1/2 turn to obtain base setting.
Note: If adjustment valve is opened too far, drill motor will not cycle, and feed cycle cannot be obtained. To correct, turn valve clockwise to seat valve and set according to instructions above.

If valve is closed too far, retract cycle cannot be obtained. To correct, turn valve counterclockwise and set according to instructions.

Closing valve increases countersink dwell time; opening valve decreases countersink dwell time.

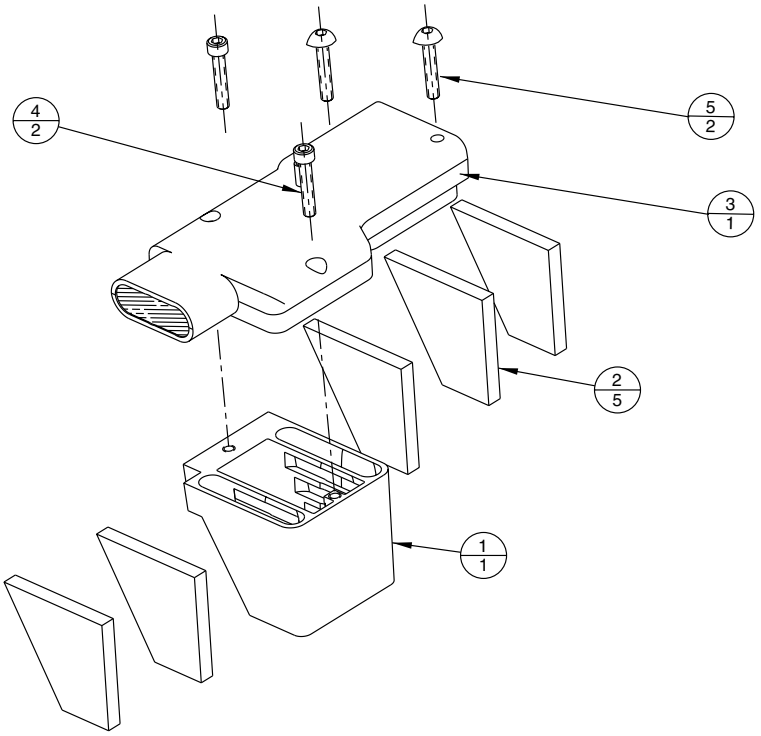
Tail Pad Adjustment

The purpose of the tail pad is to compensate for slght surface curvature of the workpiece being drilling and to assure that the hole being drilled is perpendicular to the surface.

To adjust to a flat plane for drilling flat surfaces, use a straight edge between the tail pad and face of template boss and adjust the tail pad until the straight edge is flush with the face of the template boss.

An optional tail pad is available for high curvature surfaces. (See Accessories for more information.)

180SC-225 Muffler Subassembly - 641055



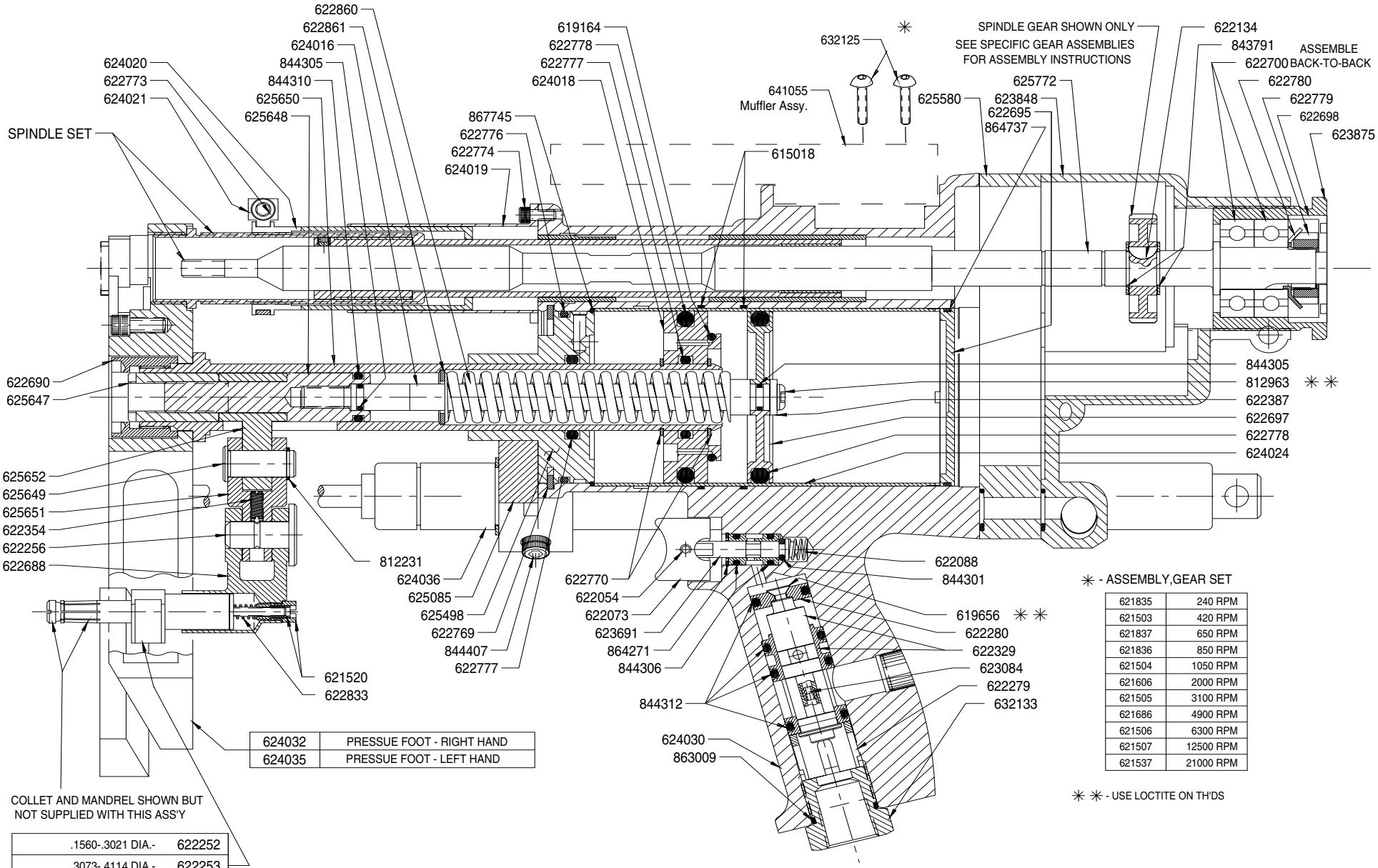
ITEM	PART NO.	PART NAME	QTY.
1	632130	BOX, MUFFLER	1
2	632126	ELEMENT, MUFFLER	5
3	632132	PLENUM	1
4	619995	SCREW, SHC (10-24UNC-3A)	2
5**	632125	SCREW, HSBHC (10-32UNF X 1.250)	2

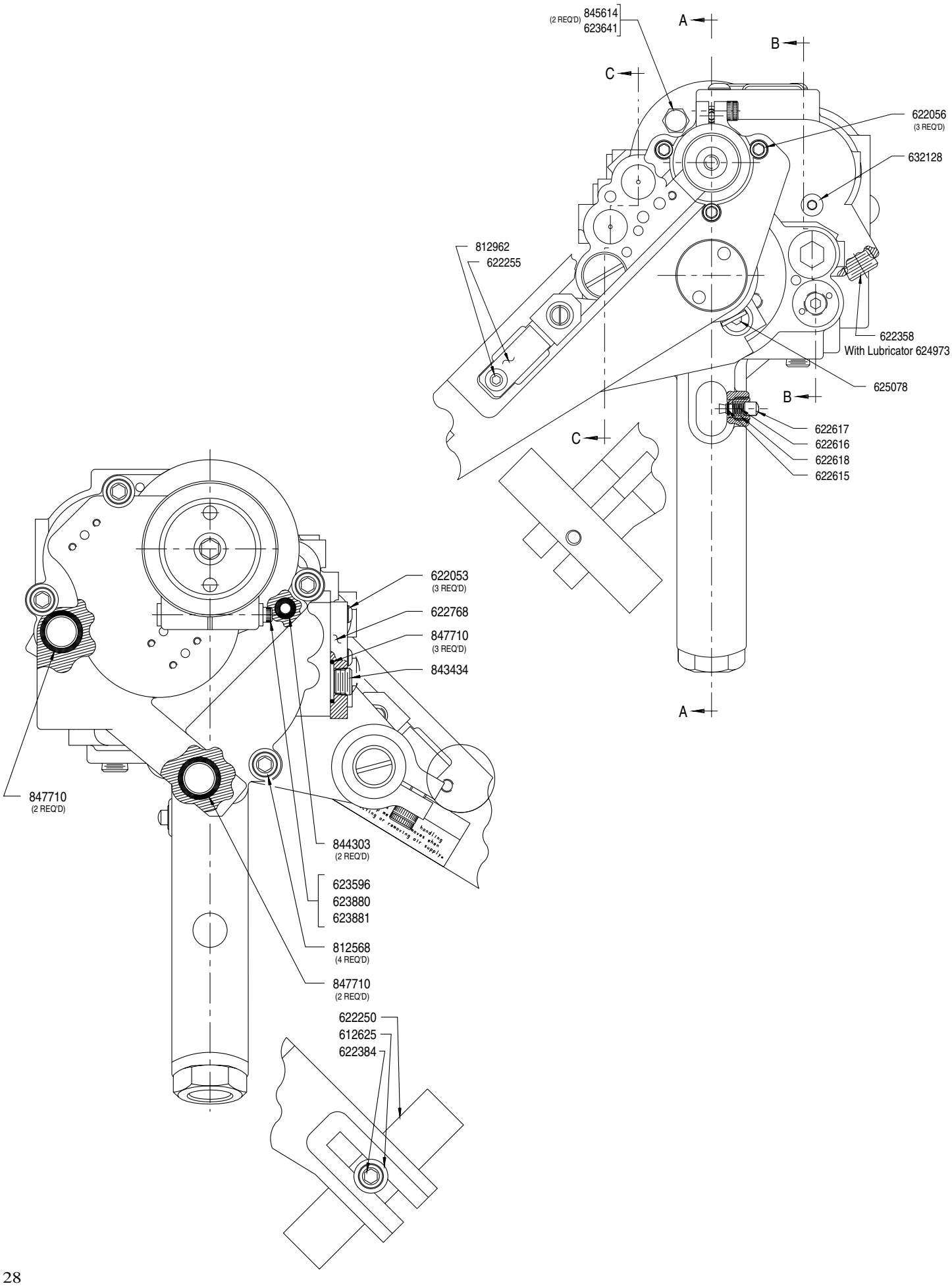
** PARTS NOT INCLUDED IN SUBASSEMBLY: 632125 - SCREWS

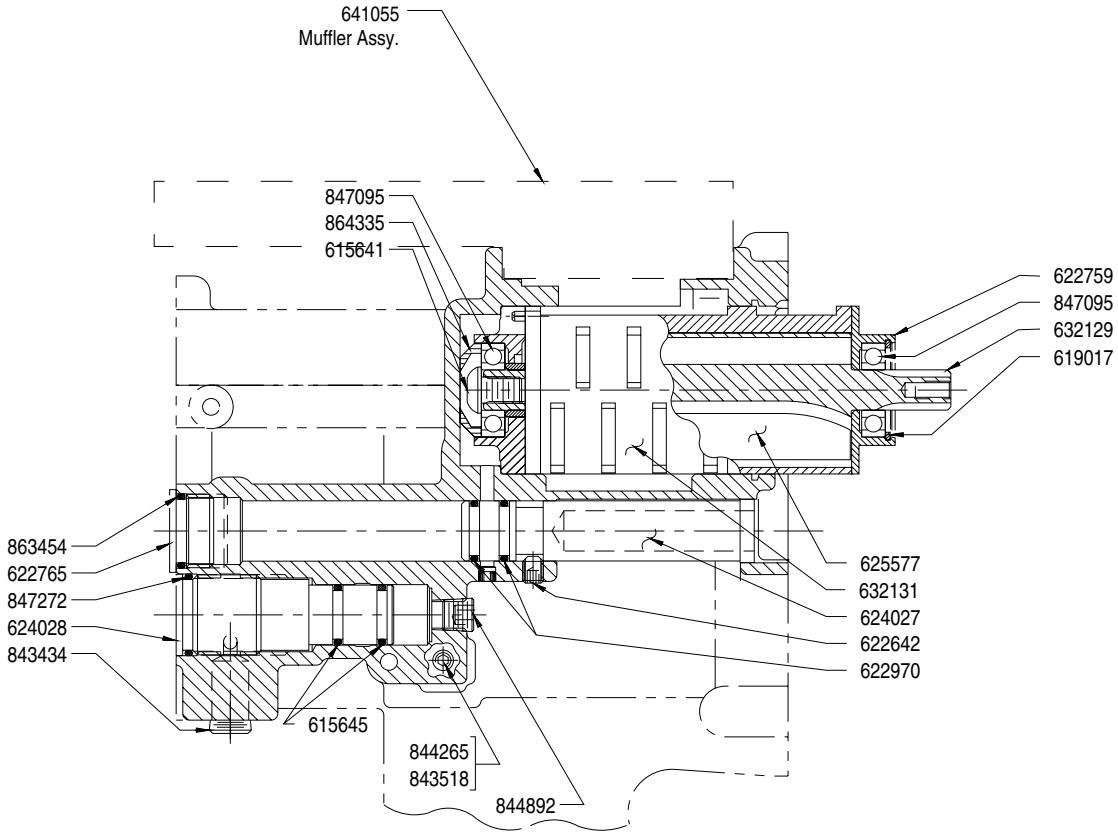
153SC-225 Upgrade to 180SC-225 Subassembly - 641052

Part No.	Name of Part	Quantity
622279	Spacer, Pilot Valve	1
622329	Subassembly, Pilot Valve	1
622758	Updated Rear Bearing Plate	1
624973	Fitting	1
625577	Rotor Blade	4
629556	Subassembly, Gear Plate Spacer	1
632125	Screw, HSBHC (10-32UNF X 1.250)	2
632128	Screw, Indexing	1
632129	Rotor	1
632131	Cylinder	1
632133	Bushing, Inlet	1
632178	Valve, In-line Non return	1
641055	Subassembly, Muffler	1

On some earlier models the 622758 Updated Rear Bearing Plate with the slot that has been added to allow the use of the 632128 Indexing Screw must be also replaced.


622860
622861
624016
844305
844310
625650
625648
624020
622773
624021
SPINDLE SET
619164
622778
622777
624018
867745
622776
622774
624019
615018
632125 ✳
641055
Muffler Assy.
625580
SPINDLE GEAR SHOWN ONLY
SEE SPECIFIC GEAR ASSEMBLIES
FOR ASSEMBLY INSTRUCTIONS
622134
843791
622700
ASSEMBLE
BACK-TO-BACK
625772
623848
622695
864737
622780
622779
622698
623875
622690
625647
625652
625649
625651
622354
622256
622688
812231
624036
625085
625498
622769
844407
622777
622770
622054
622073
623691
864271
844306
622088
844301
619656 ✳✳
622280
622329
623084
622279
632133
844312
624030
863009
844305
812963 ✳✳
622387
622697
622778
624024
621520
622833
624032 PRESSUE FOOT - RIGHT HAND
624035 PRESSUE FOOT - LEFT HAND
COLLET AND MANDREL SHOWN BUT
NOT SUPPLIED WITH THIS ASS'Y
.1560-.3021 DIA.- 622252
.3073-.4114 DIA.- 622253
.4166-.4740 DIA.- 622254
✳ - ASSEMBLY,GEAR SET
621835 240 RPM
621503 420 RPM
621837 650 RPM
621836 850 RPM
621504 1050 RPM
621606 2000 RPM
621505 3100 RPM
621686 4900 RPM
621506 6300 RPM
621507 12500 RPM
621537 21000 RPM
✳✳ - USE LOCTITE ON TH'DS


(2 REQ'D) 845614
623641
A
B
C
622056
(3 REQ'D)
632128
812962
622255
622358
With Lubricator 624973
625078
B
C
622617
622616
622618
622615
A
622053
(3 REQ'D)
622768
847710
(3 REQ'D)
843434
847710
(2 REQ'D)
844303
(2 REQ'D)
623596
623880
623881
812568
(4 REQ'D)
847710
(2 REQ'D)
622250
612625
622384


641055
Muffler Assy.
847095
864335
615641
622759
847095
632129
619017
863454
622765
847272
624028
843434
625577
632131
624027
622642
622970
615645
844265
843518
844892

PARTS LIST

Part No.	Name of Part	Qty.	Part No.	Name of Part	Qty.
203245	LABEL; CAUTION	1	623596	SCREW; SHC	1
203246	LABEL; WARNING	1	623641	NUT; ACORN	1
624032	PRESSURE FOOT; RIGHT	1	623691	ASSEMBLY; TRIGGER VALVE	1
624035	PRESSURE FOOT; LEFT	1	623848	BACKHEAD	1
624242	LABEL; WARNING	1	623875	NUT; SPINDLE ADJUSTMENT	1
612625	WASHER; PLAIN	1	623880	CLAMP; BUSHING	1
615018	O-RING	2	623881	CLAMP; NUT	1
615641	SCREW; BHC	1	624016	SHAFT; CLAMP	1
615645	O-RING	14	624018	CHECK PISTON; CLAMP	1
619017	RING; RETAINING	1	624019	COVER; DEPTH CONTROL	1
619164	O-RING	1	624020	NUT ADJUST; DEPTH CONTROL	1
619656	SCREW; SFCHC	1	624021	CLAMP; DEPTH CONTROL	1
621620	SUBASSY; BUSHING	1	624024	CYLINDER; LINER	1
622026	VALVE; NEEDLE	1	624027	PLUG; FLUID RESERVOIR	1
622053	SCREW, BHC 6-32 X .500	3	624028	PLUG; FEED CONTROL	1
622054	SCREW; SET	1	624030	HANDLE	1
622056	SCREW; SHC	3	624036	CYLINDER; HYDRAULIC FEED CONTROL	1
622073	TRIGGER	1	624121	GASKET	1
622088	SPRING	1	625078	SCREW; FLAT HEAD CAP	3
622134	KEY	1	625085	BRACKET; FEED CONTROL	1
622250	PAD; PRESSURE	1	625498	BULKHEAD; FRONT	1
622255	COLLET GUIDE CLIP	1	625577	BLADE; ROTOR	5
622256	LIFT LEVER PIN	1	625580	SPACER; BACKHEAD	1
622277	PLUG	2	625581	SPINDLE	1
622279	SPACER	1	625645	NUT; PRESSURE FOOT	1
622280	PISTON	1	625647	BUSHING; PULL ROD	1
622329	ASSY; PILOT VALVE	1	625648	PULL ROD	1
622353	SPRING; COMPRESSION	2	625649	CLEVIS PIN; LINKAGE	1
622358	PIPE; PLUG	1	625650	CLAMP-FEED SHAFT	1
622376	RING; RETAINING	2	625651	LINKAGE; CLEVIS	1
622384	SCREW; SHC	1	625652	LIFT FINGER	1
622387	SPACER	1	632125	SCREW; BHC 10-32 UNF X 1.250	2
622615	RING; RETAINING	1	632131	CYLINDER	1
622616	SPRING	1	632133	BUSHING; INLET	1
622617	PIN; TRIGGER LOCK	1	641055	SUBASSEMBLY; MUFFLER	1
622618	BUSHING; TRIGGER LOCK	1	812164	PIN; SPRING	1
622620	SUBASSY; CHECK VALVE	1	812231	RING; RETAINING	1
622642	SCREW	1	812568	SCREW; ALLEN CAP	4
622688	HOLDER; COLLET	1	812962	SCREW; BHC 10-32 UNF X .250	1
622695	BULKHEAD; REAR	1	812963	SCREW; BHC 10-32 UNF X .500	1
622697	PISTON; CLAMP-UNCLAMP	1	832128	SCREW; INDEXING	1
622698	NUT; BEARING RETAINING	1	832129	ROTOR	1
622700	BEARING; BALL	2	843434	PLUG; PRESSURE	2
622757	SUBASSY; VALVE	1	843518	SCREW; SET	1
622758	PLATE; REAR BEARING	1	843791	RING; RETAINING	2
622759	PLATE; FRONT BEARING	1	843913	COLLAR; ROTOR	1
622765	PLUG; RESERVOIR	1	844265	BALL (1/8)	1
622768	COVER	1	844301	O-RING	2
622769	RING; RETAINING	1	844303	O-RING	1
622770	RING; RETAINING	2	844305	O-RING	2
622773	SCREW; SHC	1	844306	O-RING	2
622774	SCREW; SHC	3	844310	O-RING	1
622775	SCREW; BHC	3	844312	O-RING	4
622776	O-RING	1	844892	PLUG; PIPE	1
622777	O-RING	2	845614	SCREW; SFCHC	2
622778	O-RING	2	847095	BEARING; BALL	2
622779	LOCKNUT	1	847272	O-RING	2
622780	WASHER; LOCK	1	847665	RING; RETAINING	1
622833	COLLET SPRING	1	847710	O-RING	7
622860	SPRING; COMPRESSION	1	863009	O-RING	1
622861	WASHER	1	863454	O-RING	1
622862	NON-REGULATING PLUG	1	864271	SNAP RING	1
622970	O-RING	2	864335	BEARING CAP	1
623084	SCREW; ORIFICE	1	864737	O-RING	1
			867745	O-RING	1

GEAR SET ASSEMBLIES

621835 - 240RPM

Part No.	Name of Part	Qty.
623848 REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
623772	Plate, Gear Set	2
623770	Gear, Spindle	1
623769	Pinion, Reduction	1
623771	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	1
622134	Key, Woodruff	1
833689	Ring, Retainer	2
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly. Retainer Ring is used on the 180 RPM only.

621503 - 420RPM

Part No.	Name of Part	Qty.
623848 REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
622803	Plate, Gear Set	2
622800	Gear, Spindle	1
622801	Pinion, Reduction	1
622802	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621837 - 650RPM

Part No.	Name of Part	Qty.
623848 REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
623773	Plate, Gear Set	2
623779	Gear, Spindle	1
622801	Pinion, Reduction	1
623778	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621836 - 850RPM

Part No.	Name of Part	Qty.
623848 REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
623774	Plate, Gear Set	2
623776	Gear, Spindle	1
622801	Pinion, Reduction	1
623777	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621504 - 1050RPM

Part No.	Name of Part	Qty.
623848 REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
622807	Plate, Gear Set	2
622806	Gear, Spindle	1
622801	Pinion, Reduction	1
622799	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621606 - 2000RPM

Part No.	Name of Part	Qty.
623848 REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
623259	Plate, Gear Set	2
623258	Gear, Spindle	1
623257	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621505 - 3100RPM

Part No.	Name of Part	Qty.
623848		
REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
622786	Plate, Gear Set	2
622783	Gear, Spindle	1
622784	Pinion, Reduction	1
622785	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621686 - 4900RPM

Part No.	Name of Part	Qty.
623848		
REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
622796	Plate, Gear Set	2
623795	Gear, Spindle	1
622784	Pinion, Reduction	1
622785	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621506 - 6300RPM

Part No.	Name of Part	Qty.
623848		
REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
622805	Plate, Gear Set	2
622804	Gear, Spindle	1
622784	Pinion, Reduction	1
622785	Gear, Reduction	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear is not shown, but is supplied loose with assembly.

621507 - 12500RPM

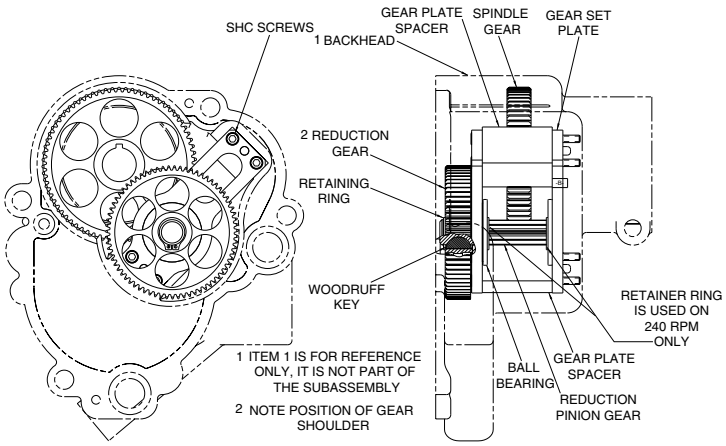
Part No.	Name of Part	Qty.
623848		
REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
622809	Plate, Gear Set	2
622804	Gear, Spindle	1
622784	Pinion, Reduction	1
622785	Gear, Reduction	1
622902	Gear, Pinion Overlay	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear and Pinion Overlay Gear are not shown, but is supplied loose with assembly.

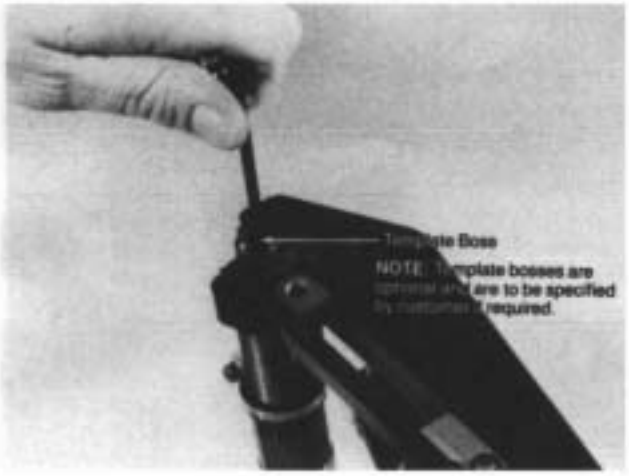
621537 - 21000RPM

Part No.	Name of Part	Qty.
623848		
REF.	Assembly, Backhead	1
621515	Assembly, Spacer	1
622903	Plate, Gear Set	2
622904	Gear, Spindle	1
622784	Pinion, Reduction	1
622785	Gear, Reduction	1
622902	Gear, Pinion Overlay	1
622129	Bearing, Ball, Flng	2
812231	Ring, Retaining	3
622134	Key, Woodruff	1
622787	Screw, Soc, Hd, Cap	4
629556	Gear Plate Spacer	1

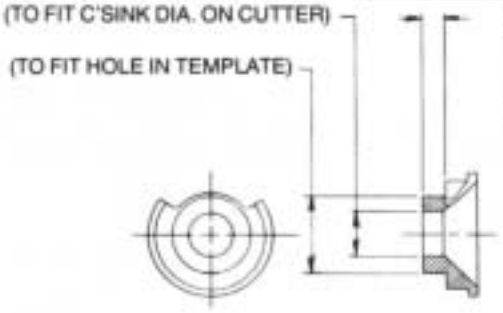
Backhead Assembly is shown for reference only and is not part of the gear assembly. Spindle Gear and Pinion Overlay Gear are not shown, but is supplied loose with assembly.



Template Boss



TEMPLATE HOLE DIAMETER	CUTTER COUNTER-SINK DIAMETER	.150 BOSS LENGTH	.200 BOSS LENGTH
.500	.375	624087	623896
.625	.500	623708	623897
.750	.625	623720	623898
.875	.750	623716	623899
1.000	.781	623725	
1.000	.875	624034	
1.250	.875	624486	



TEMPLATE BOSS LENGTH (TO ACCOMMODATE TEMPLATE THICKNESS:
- USE .150 LENGTH FOR TEMPLATE THICKNESS TO .125
- USE .200 LENGTH FOR TEMPLATE THICKNESS TO .187

Jig Collet Foot Attachments

Depth Sensing Jig Collet Foot (Pictured)
Depth sensing jig collet foot is used for accurately drilling and countersinking hole layouts utilizing a simple fixture plate. The cutter passes centrally through the drillmotor collet to produce holes concentric with the fixture plate holes. The depth sensing sleeve will drill and accurately countersink with fixture-to-workpiece variations of up to .125". Coolant and air blast port is fitted to the foot.

User must specify template hole and drill-countersink size as well as drill-countersink configuration.

Non Depth Sensing Jig Collet Foot
Non-depth sensing jig collet foot is similar to the above foot without depth sensing capability. This foot is used for straight drilling applications where "rough" depth sensing only is required. This foot grips straight shank drills utilizing an "O-W" type collet (not supplied).

User must specify template hole and drill size.

High Curvature Pad Assembly

A high curvature pad (Part No. 621522) is available for use in place of the standard pressure foot pad. The high curvature pad enables the drill to be used on surfaces with a greater curvature than the standard pad is capable of handling.

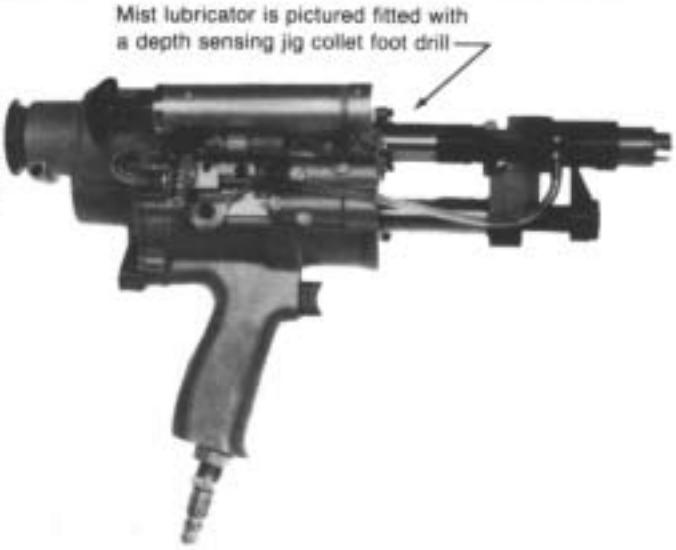
Booster Pump Assembly

For increased clamping force or feed pressure, an optional Booster Pump Kit (Part No. 621950) is available. The pump provides extra clamp and feed pressures when drilling Titanium or taper drilling applications.

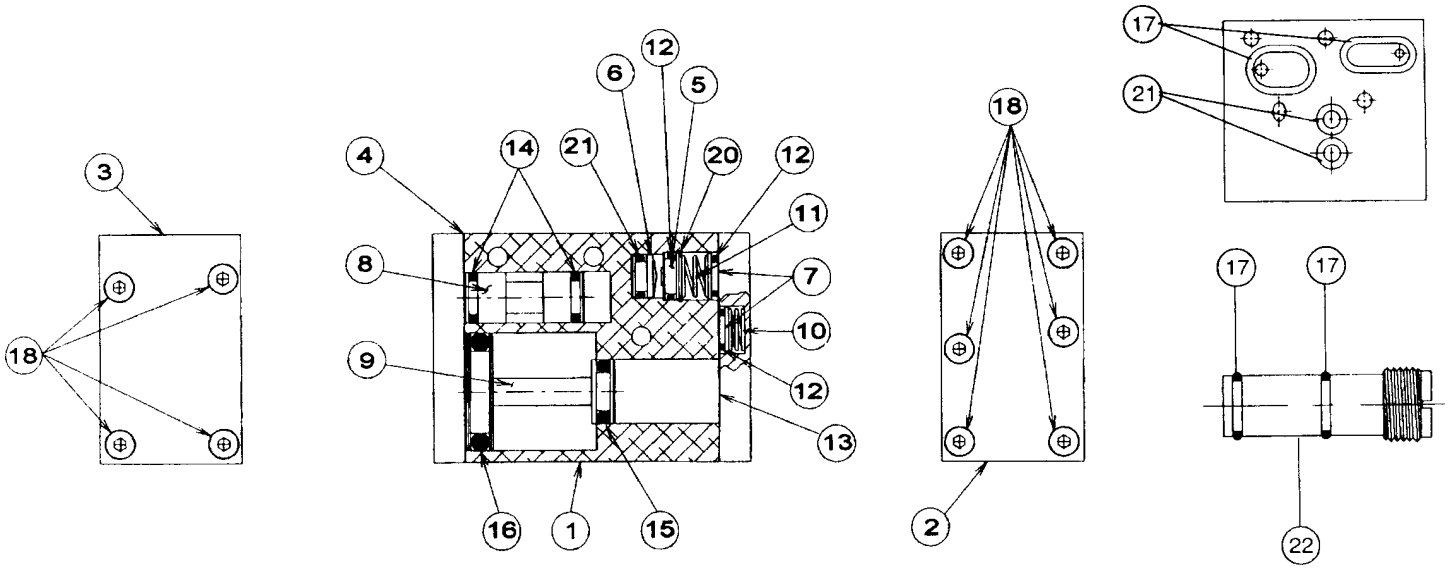
The Booster Pump assembly will increase both clamp and feed forces by a factor of 2.5. The pump is easily installed on the Q-Matic Drill by replacing the cover supplied with the tool with the Booster Pump Kit using the three screws supplied with the pump, and replacing the non-regulating plug(Part No. 622862) and O-ring (Part No. 847272) with the booster pump plug (Part No. 624745) and two O-rings (Part No. 847710).

Mist Lubricator Assembly

Two mist lubricator assemblies are available to introduce coolant and an air blast to the cutter. The lubricator is actuated by air from the accessory air tap on the motor side and only functions when the motor is running. On the following pages are the two different models.



Booster Pump Assembly Instructions

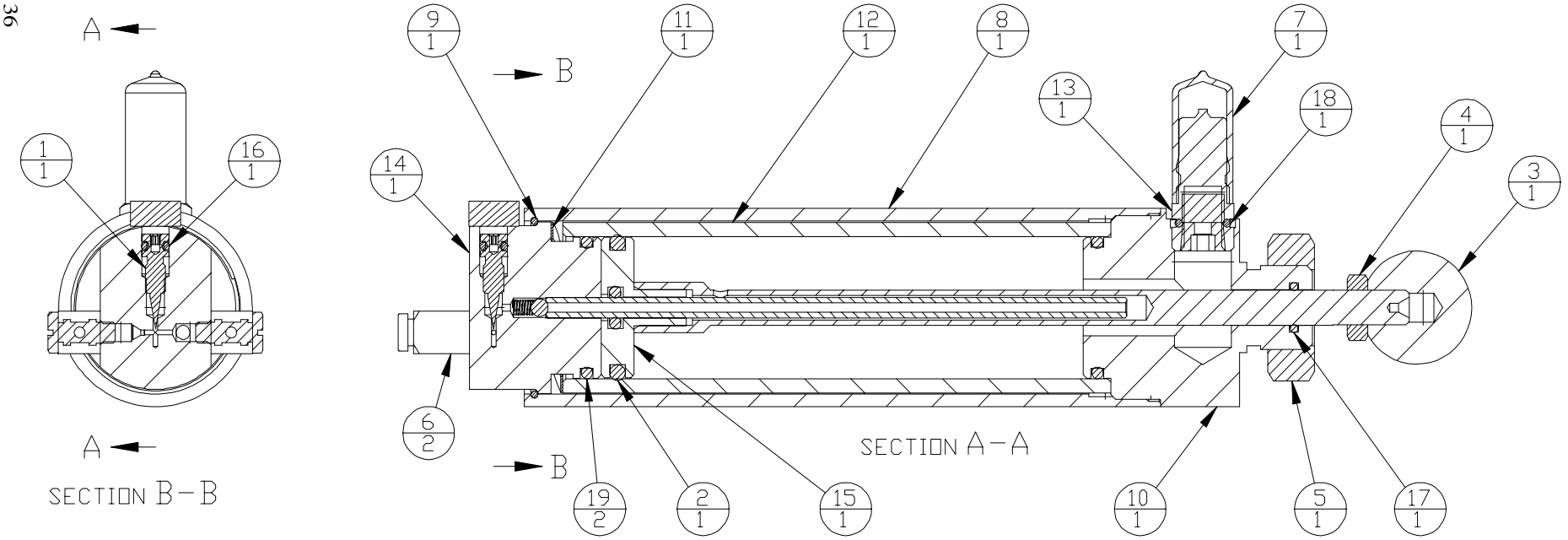


Booster Pump Assembly 621950

ITEM NUMBER	QTY.	PART NUMBER	DESCRIPTION
1	1	621500	ASSEMBLY, BODY
2	1	621501	ASSEMBLY, END PLATE, HIGH PRESSURE
3	1	622660	END PLATE, LOW PRESSURE
4	1	622792	GASKET, END PLATE, LOW PRESSURE
5	1	622662	VALVE, PRESSURE RELIEF
6	1	622663	PISTON, PRESSURE RELIEF
7	2	622664	VALVE,CHECK
8	1	622665	VALVE, SHUTTLE
9	1	622666	PISTON
10	1	622652	SPRING, COMPRESSION, (.34 LENGTH)
11	1	622653	SPRING, COMPRESSION, (.88 LENGTH)
12	3	844304	0-RING
13	1	625112	GASKET, END PLATE, HIGH PRESSURE
14	2	622654	0-RING
15	1	844308	0-RING
16	1	844315	0-RING
17	4	847710	0-RING
18	10	863337	SOCKET HEAD CAP SCREW
19	3	617245	SOCKET HEAD CAP SCREW
20	1	622845	RETAINING RING
21	3	844303	0-RING
22	1	624745	PLUG, BOOSTER PUMP

INSTALLATION INSTRUCTIONS

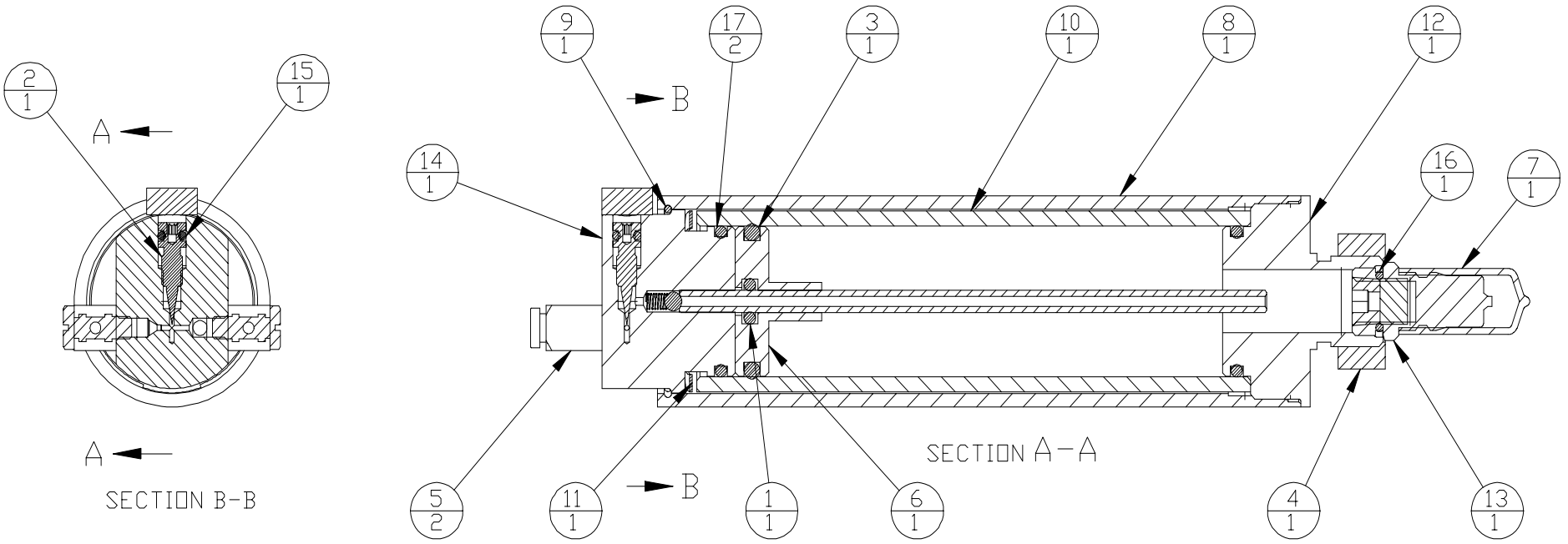
1. Remove (3) screws No.622050 and cover No.622768 attached to tool.
2. Install (2) 0-rings #17 and (2) #21 in booster pump if not already installed.
3. Install booster pump No.621482 with (3) screws #19 provided.
4. Remove plug, non-regulating No.622862, with slot screwdriver (Refer to service instructions for location).
5. Install (2) 0-rings #17 onto booster pump plug #22.
6. Install booster pump plug #22.



631799 MANUAL FILL LARGE CAPACITY

Note: (x / x) Upper number is item. Lower number is quantity required.

ITEM	PART NO.	PART NAME	QTY.
1	632725	VALVE, NEEDLE	1
2	622881	RING, O	1
3	623422	KNOB	1
4	624902	NUT, JAM HEX	1
5	624903	NUT, JAM HEX	1
6	624905	FITTING	2
7	625015	S-CAP	1
8	629086	COVER, LARGE CAPACITY	1
9	629093	WIRE, RETAINING	1
10	629088	CAP, MOUNT (PUMP FILL)	1
11	629148	SPRING, WAVE	1
12	629090	CYLINDER, LARGE CAPACITY	1
13	631586	FILTER ASSEMBLY	1
14	631756	END CAP ASSEMBLY (LARGE)	1
15	631759	PISTON ROD ASSY (LARGE)	1
16	844301	RING, O	1
17	844306	RING, O	1
18	844307	RING, O	1
19	869025	RING, O	2



631802 PRESSURE FILL LARGE CAPACITY

Note: (x/x) Upper number is item. Lower number is quantity required.

ITEM	PART NO.	PART NAME	QTY.
1	203568	RING, O	1
2	632725	VALVE, NEEDLE	1
3	622881	RING, O	1
4	624903	NUT, JAM HEX	1
5	624905	FITTING	2
6	624914	PISTON	1
7	625015	S-CAP	1
8	629086	COVER, LARGE CAPACITY	1
9	629093	WIRE, RETAINING	1
10	629090	CYLINDER, LARGE CAPACITY	1
11	629148	SPRING, WAVE	1
12	629095	CAP, MOUNT (PRESSURE FILL)	1
13	631586	FILTER ASSEMBLY	1
14	631756	END CAP ASSEMBLY (LARGE)	1
15	844301	RING, O	1
16	844307	RING, O	1
17	869025	RING, O	2

PRESSURE FILL MIST LUBRICATOR

MOUNTING FOR MIST LUBRICATOR

TROUBLE SHOOTING

SYMPTOM	REASON	SOLUTION
Air motor and/or clamp and feed functions do not start when trigger is depressed.	Trigger or pilot valves clogged with foreign matter.	Remove trigger and pilot valves (separately) and inspect for rust or debris. Inspect O-rings and replace if necessary,
Air motor does not run when trigger is depressed, but feed and clamp functions properly.	Gears damaged or jammed with debris.	With air line disconnected check for free spindle rotation with hex key wrench in end of spindle. Remove backhead, clean and inspect gears for damage.
	Foreign matter in motor inlet.	Remove motor and clean debris from motor inlet.
	Broken rotor blades, rotor or gear bearings.	Remove motor and inspect rotor blades and bearings. Replace if necessary.
Air motor “idles” when trigger valve is released.	Pilot valve or retract and dwell valve sticky (not fully reset), or bad O-ring.	Remove and check valves for debris and free movement of spool. Inspect O-rings, lubricate and reassemble.
	Leaking O-ring on air motor rear bear--ing support.	Remove and inspect O-rings. Replace if necessary and reassemble.
Motor runs, but clamp & feed functions do not start.	Unclamp check valve doesn’t shift when trigger is depressed.	Remove unclamp check valve and inspect for debris, free movement and damaged O-rings. Lubricate and reassemble.
Motor runs, clamps but doesn’t feed.	Feed control valve “closed”	Back off feed control valve counterclockwise until feed commences.
Lunge during feed or variation in feed rate.	Defective feed control cylinder.	Replace feed control cylinder.
Tool doesn’t retract at end of feed stroke.	Dwell valve seated too tightly.	Back dwell valve off from seat 1/8 turn to 1 & 1/2 turn.
	Retract and dwell valve doesn’t shift.	Remove retract and dwell valve and inspect for debris, free movement and damaged O-rings. Lubricate and reassemble.
Tool retracts shortly after trigger depressed.	Depth control adjusted out of the max. range of the tool.	Readjust depth control nut within the feed stroke of the tool (ref.: 1.10 max. stroke).
	Dwell valve opened too far off of seat.	Turn dwell valve clockwise (should be 1/8 to 1&1/2 turns of seat).
Tool “pulses” on retract (rapid ‘’feed retract-feed retract”).	Damaged O-rings on retract and dwell valve.	Remove retract and dwell valve, inspect O-rings and replace as necessary. Lubricate and reassemble.

MAINTENANCE KIT - 621953

PART NO.	NAME OF PART	QTY.
382370	Tool box	1
622849	Assembly tool	1
623014	Assembly tool, press. Foot nut	1
623015	Assembly tool, trigger lock	1
623334	Assembly tool, pressure hydraulic & front enclosure	1
623515	Assembly tool, pressure foot nut	1
623520	Assembly tool, bulkhead removal	1
623647	Assembly tool, depth stop	1
632424	Removal tool, valve	1
624759	Slide hammer puller	1
624760	Assembly fixture	1
624761	Wrench, spindle bearing locknut	1
624762	Bearing installer	1
624763	Removal tool, feed control valve	1
624764	Removal tool, pilot valve	1
624765	Arbor press fixture	1
624766	Valve installation tool	1
624767	Wrench, feed control valve	1
624768	Tee wrench, foot body	1
629251	Tool, 136SC pull rod bushing	1
629252	Tool, 15/120SC pull rod bushing	1

Sales & Service Centers

Note: All locations may not service all products. Please contact the nearest Sales & Service Center for the appropriate facility to handle your service requirements.

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Fax: (248) 391-6295

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